

# DRAFT

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AIR FORCE AND NAVY**

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**Civil Engineering**

**★ENGINEERING WEATHER DATA**

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OPR: HQ AFCESA/CESM  
(Mr. K. Quinn Hart, P.E.)  
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Certified by: HQ AFCESA/CES  
(Col Michael J. Cook)  
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This handbook provides climatic information for selected sites to assist in design and construction of DoD facilities worldwide. It implements AFPD 32-10, Installations and Facilities. Send all recommendations for changes or improvements to this handbook on AF Form 847, **Recommendation for Change of Publication**, through the major commands (MAJCOM) and HQ AFCESA/CESM, 139 Barnes Drive, Suite 1, Tyndall AFB FL 32403-5319 to HQ USAF/ILEO, 1260 Air Force Pentagon, Washington DC 20330-1260.

## SUMMARY OF REVISIONS

**This document is substantially revised and must be completely reviewed.**

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## Chapter 1

### DATA DESCRIPTION AND SUGGESTIONS FOR USE

**1.1. Introduction.** The data in this handbook were compiled by the Air Force Combat Climatology Center (AFCCC) at the request of the Air Force Civil Engineer Support Agency (HQ AFCESA). Sites were identified by AFCESA, US Army Corps of Engineers (USACE), and the Naval Facilities Engineering Command (NAVFACENGCOM). Final selection of sites was based upon availability of climatological data. Most are located at military installations supporting airfield operations, or at local airports/airfields. Department of Defense agencies and DoD contractors may obtain data for additional sites by providing site coordinates and elevation in written request to AFCCC/DOO, 151 Patton Avenue, Room 120, Asheville, North Carolina, 28801-5002. Non-DoD users should contact the National Climatic Data Center, Federal Building, Asheville, North Carolina, 28801. Nongovernmental site data may be obtained from a private consulting meteorologist or the following web site: <http://www.ncdc.noaa.gov>.

**1.2. Accessing the Data.** To access the weather information for a given site, locate the site in the index in chapter 2; then double-click "IP" for inch-pound measurements, or "SI" for standard international (metric) units. U.S. sites are listed alphabetically by state; non-U.S. sites are listed alphabetically by country. Depending upon the extent of the available data, site data sets may be either unabridged (18 pages), or abridged (first 4 pages of the unabridged version). Sites presented in the index in boldface type are unabridged.

**1.3. Explanation of Data and Suggested Applications.** The remainder of this chapter presents a summary for each page in a typical site data set, and guidance for using the data. It applies to both abridged and unabridged data sets.

## Section 1A—Data Set Page 1, Climate Summary

**1.4. Location Information.** This section contains a summary table which includes site name, location, elevation (above mean sea level), World Meteorological Organization (WMO) number, period of record (POR), and average (atmospheric) pressure not corrected to sea level (higher elevations result in lower pressures). The WMO number is a unique number assigned to every location in the world that takes and transmits regular weather observations. The POR is the time frame over which the data used to compute the statistics in this handbook was compiled.

**1.5. Design Values.** Design values are provided for dry bulb temperature, wet bulb temperature, and humidity ratio at specific percentile frequencies of occurrence. The old EWD summer design values of 1, 2.5, and 5 percent were based on the warmest four months of the year. In the United States this was standardized as June through September. The new design values of 0.4, 1, and 2 percent are based on the entire year. The old winter design values of 99 and 97.5 percent were based on the three coldest months of the year (December through February). The new winter design values of 97.5, 99.6 and 99 percent are based on the entire year. In other words the new design values are **annual** values not **seasonal** values. In general, for mid-latitude locations with continental climates (hot summer – cold winter), there are some *generalizations* that can be made about the differences between the old and new values. The new 0.4% annual value is comparable to the old 1% seasonal value. The new 1% annual value is usually about a degree cooler than the old 2.5% seasonal value. The new 2% annual value is similar to the old 5% seasonal value. The new 99.6% and 99% annual values are generally cooler than the old 99% and 97.5% seasonal values, however there is more variability between stations. The new design values were instituted for several reasons. At some locations, the warmest or coldest months of the year do not fall into the months listed above. It is easier to compare locations that are in tropical or marine climates where there is less seasonal variability. It is also more straightforward to compare Southern Hemisphere locations.

### 1.5.1. Dry Bulb Temperature:

1.5.1.1. Median of Extreme Highs (or Lows). The dry bulb temperature extreme high (or low) is determined for each calendar year of the POR along with the coincident values for wet bulb temperature, humidity ratio, wind speed, and prevailing wind direction. From the distribution of extreme highs (or lows) and coincident values, median values are determined.

1.5.1.2. 0.4%, 1.0%, 2.0%, 97.5%, 99.0%, and 99.6% Occurrence Design Values. Listed is the dry bulb temperature corresponding to a given annual cumulative frequency of occurrence and its respective mean coincident values for wet bulb temperature, humidity ratio, wind speed, and prevailing wind direction. This represents the dry bulb threshold which exceeded its respective percent of time, taking into account the entire POR. For example, the 1.0% occurrence design value temperature has been exceeded only 1% of the time during the entire POR. All the observations occurring within one degree of the design value are grouped, and the coincident mean values for wet bulb temperature, humidity ratio, and wind speed are calculated. The prevailing wind direction (the ‘mode’ of the wind direction distribution) is also calculated.

1.5.1.3. Mean Daily Range. The mean daily range (difference between daily maximum and daily minimum temperatures) is the average of all daily dry bulb temperature ranges for the POR.

1.5.2. Wet Bulb Temperature. "Median of Extreme Highs" for wet bulb temperature is the highest annual extreme wet bulb temperature averaged over the POR. The corresponding mean coincident values are determined the same way as for dry bulb temperature. 0.4%, 1.0 %, 2.0% occurrence wet bulb temperature design values and the corresponding mean coincident values for dry bulb temperature are determined the same way as for dry bulb temperature.

1.5.3. Humidity Ratio. "Median of Extreme Highs" for humidity ratio is the highest annual extreme averaged over the POR. The corresponding mean coincident values are determined the same way as for dry bulb temperature. Design values are provided for "Humidity Ratio" at the 0.4%, 1.0%, and 2.0% occurrence and the corresponding mean coincident values for dry bulb temperature, vapor pressure, wind speed, and wind prevailing direction.

1.5.4. Air Conditioning/Humid Area Criteria. These are the number of hours, on average, that dry bulb temperatures of 93 °F (34 °C) and 80 °F (27 °C) and wet bulb temperatures of 73 °F (23 °C) and 67 °F (19 °C) are equaled or exceeded during the year.

**1.6. Other Site Data.** This information is provided **for general reference only, and should NOT be used as the basis for design.** There are some locations for which this data is not available. In these cases, that portion of the table will be left blank.

1.6.1. Weather Region. There are eleven weather regions developed by the Department of Energy. They are defined by the range of cooling-degree days and heating-degree days.

1.6.2. Ventilation Cooling Load Index. The VCLI is a two-part index which defines the total annual cooling load for ventilation air by calculating sensible heat load separately from the latent heat load (moisture). The results are expressed in ton-hours per cubic feet per minute per year of latent and sensible load. Values for sensible heat load are calculated by comparing the outdoor temperature to indoor conditions (75 °F and 60% relative humidity [RH]), and calculating how much energy is required to bring the outdoor air to the indoor temperature. The latent load is calculated similarly. Separate calculations are made for each hour of the year, and them summed to form the annual VCLI.

1.6.3 Average Annual Freeze-Thaw Cycles. This is simply the average number of times per year that the air temperature first drops below freezing and then rises above freezing, regardless of the duration of either the freezing or thawing. The number of cycles is summed per year, and averaged over the entire POR. Days with high temperatures or low temperatures at 32 °F (0 °C) are not counted for a freeze-thaw cycle. A cycle is counted only when the temperature drops below freezing (31 °F [-0.5 °C] or colder) or goes above freezing (33 °F [0.5 °C] or warmer).

1.6.4. Other Values. The following are derived from sources other than the AFCCC. Engineers and architects should contact the organizations listed below for current values, including background information and complete guidelines for use of these data elements.

#### 1.6.4.1. Groundwater:

The National Groundwater Educational Foundation  
601 Dempsey Road  
Westerville OH  
(800) 551-7379

**Note:** Average groundwater temperature parallels long-term average air temperature, because soil at a depth of 50 feet (15 meters) does not undergo significant temperature change over the course of a year. Soil temperature at 50 feet stays slightly warmer than average annual air temperature by about 2.5 degrees Fahrenheit (1.4 degrees Celsius).

#### 1.6.4.2. Rain Rate:

International Plumbing Code  
BOCA International  
4051 West Flossmoor Road  
Country Club Hills IL 60478  
(708) 799-2300

#### 1.6.4.3. Frost Depth, Basic Wind Speed, Ground Snow Loads:

ANSI/ASCE 7-95

American Society of Civil Engineers  
1015 15th Street NW, Suite 600  
Washington DC 20005  
(800) 548-2723

**Note:** Frost depth penetration data was obtained from TI 809-01, Load Assumptions for Buildings (1986) which is published by the Army Corps of Engineers. Wind and snow load data are provided by the American Society of Civil Engineers (1995); where snow load data was not available from ASCE, TI-809-01 (1986) was used. However, since the completion of this project, a new version of TI-809-01 has also been completed. Many of the new snow loads have changed. Current values can be obtained at: <http://www.hnd.usace.army.mil/techinfo/ti/809-01.pdf>.

**1.7. Suggestions for Use.** The dry bulb, wet bulb, and humidity ratio values shown are peak load conditions and are used for sizing mechanical equipment. Design guidance determines the level of occurrence applied.

1.7.1. The 0.4% Dry Bulb Temperature value is seldom used for sizing conventional comfort control systems, but is sometimes appropriate for mission-critical systems where equipment failure due to high heat would be unacceptable. Using the 0.4% value for equipment sizing requires that the engineer consider its operation at less-than-peak design conditions. In the past, oversized cooling equipment has been incapable of modulating during the more common range of operating conditions, yielding comfort control problems. Also, over-sized equipment cycles on and off more frequently, increasing maintenance costs and failing to remove enough moisture to maintain humidity control.

1.7.1.1. Similar cautionary notes apply to the extreme low dry bulb temperature. Heating equipment designed for extreme conditions must be carefully evaluated to ensure that they will modulate properly to maintain comfort at less extreme outdoor temperatures that occur 99.6% of the hours during the year.

1.7.1.2. The mean coincident value for humidity at the 0.4% peak dry bulb temperature is not the highest moisture value, and must not be used for design of humidity control systems. The mean coincident value is the arithmetic average of all the moisture levels which occur when the dry bulb temperature is high. However, the highest moisture values typically occur when the dry bulb temperatures are lower.

1.7.2. High wet bulb temperature is used for sizing cooling towers and other evaporative equipment.

1.7.3. Peak humidity ratio is used for sizing dehumidification systems. Peak moisture condition usually represents a higher enthalpy (total heat) than peak dry bulb condition. Consequently, engineers use the peak moisture condition to cross-check operation of a system which may be primarily intended to control temperature.

1.7.4. Coincident wind speed allows the engineer to accurately estimate latent loads due to infiltration of humid air in the summer and infiltration of dry air during the winter.

**Cautionary Note:** The same precautions which apply to heating and cooling equipment also apply to dehumidification and humidification systems. Oversized equipment may not control properly under typical operating conditions without special attention from the engineer.

Figure 1.1. Sample Data Set Page 1.

<b>SCOTT AFB/BELLEVILLE IL</b>		WMO No. 724338	
Latitude = 38.55 N	Longitude = 89.85 W	Elevation = 453 feet	Average Pressure = 29.52 inches Hg
Period of Record = 1967 to 1996			

Design Criteria Data					
<b>Dry Bulb Temperature (T)</b>	<b>Design Value (°F)</b>	Mean Coincident (Average) Values			
		Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	99	78	110	7.3	SSW
0.4% Occurrence	95	78	117	7.6	S
1.0% Occurrence	92	76	115	7.7	S
2.0% Occurrence	90	75	111	7.6	S
Mean Daily Range	19	-	-	-	-
97.5% Occurrence	16	14	8	7.6	NW
99.0% Occurrence	9	8	6	7.6	NW
99.6% Occurrence	3	2	4	7.5	NNW
Median of Extreme Lows	-3	-4	3	7.0	NW
<b>Wet Bulb Temperature (T<sub>wb</sub>)</b>	<b>Design Value (°F)</b>	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	82	92	146	6.8	S
0.4% Occurrence	80	91	136	6.6	S
1.0% Occurrence	78	88	128	6.6	S
2.0% Occurrence	77	87	125	6.4	S
<b>Humidity Ratio (HR)</b>	<b>Design Value (gr/lb)</b>	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	153	89	1.00	6.0	S
0.4% Occurrence	142	87	0.94	5.2	S
1.0% Occurrence	134	85	0.88	5.8	S
2.0% Occurrence	129	84	0.85	5.2	S
<b>Air Conditioning/ Humid Area Criteria</b>	# of Hours	T ≥ 93°F	T ≥ 80°F	T <sub>wb</sub> ≥ 73°F	T <sub>wb</sub> ≥ 67°F
		84	1033	773	1897

**Other Site Data**

Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
7	3.3	90	2.7 + 1.1
Ground Water Temperature (°F) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft <sup>2</sup> )	Average Annual Freeze-Thaw Cycles (#)
57.9	38	15	53

\*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.

**Section 1B—Data Set Page 2, Average Annual Climate**

**1.8. Explanation of Graph.** The graph shows the monthly mean temperature, dewpoint, and precipitation. The bar graph representing precipitation uses the scale on the right side of the chart (inches or centimeters). Lines of temperature and dewpoint use the scale on the left side of the chart (degrees Fahrenheit or Celsius). These charts have fixed maximum and minimum values on their axes for easy comparison between different sites. The precipitation chart is capped at a maximum of 15 inches (45 centimeters) per month. A few sites may exceed this value; but to keep the graph readable, a fixed maximum value was used. There are a number of sites for which accurate precipitation data was not available. If this is the case, then no bars are printed on the chart.

**1.9. Suggestions for Use:**

1.9.1. This graph displays the average behavior of weather over a single year. An architect can compare rainfall patterns at one station with another to evaluate differences in gutter and drain sizing, and also the relative importance of water resistance for the exterior envelope. An engineer can compare the temperature and moisture patterns to understand the relative importance of sensible heat loads vice latent loads at this location.

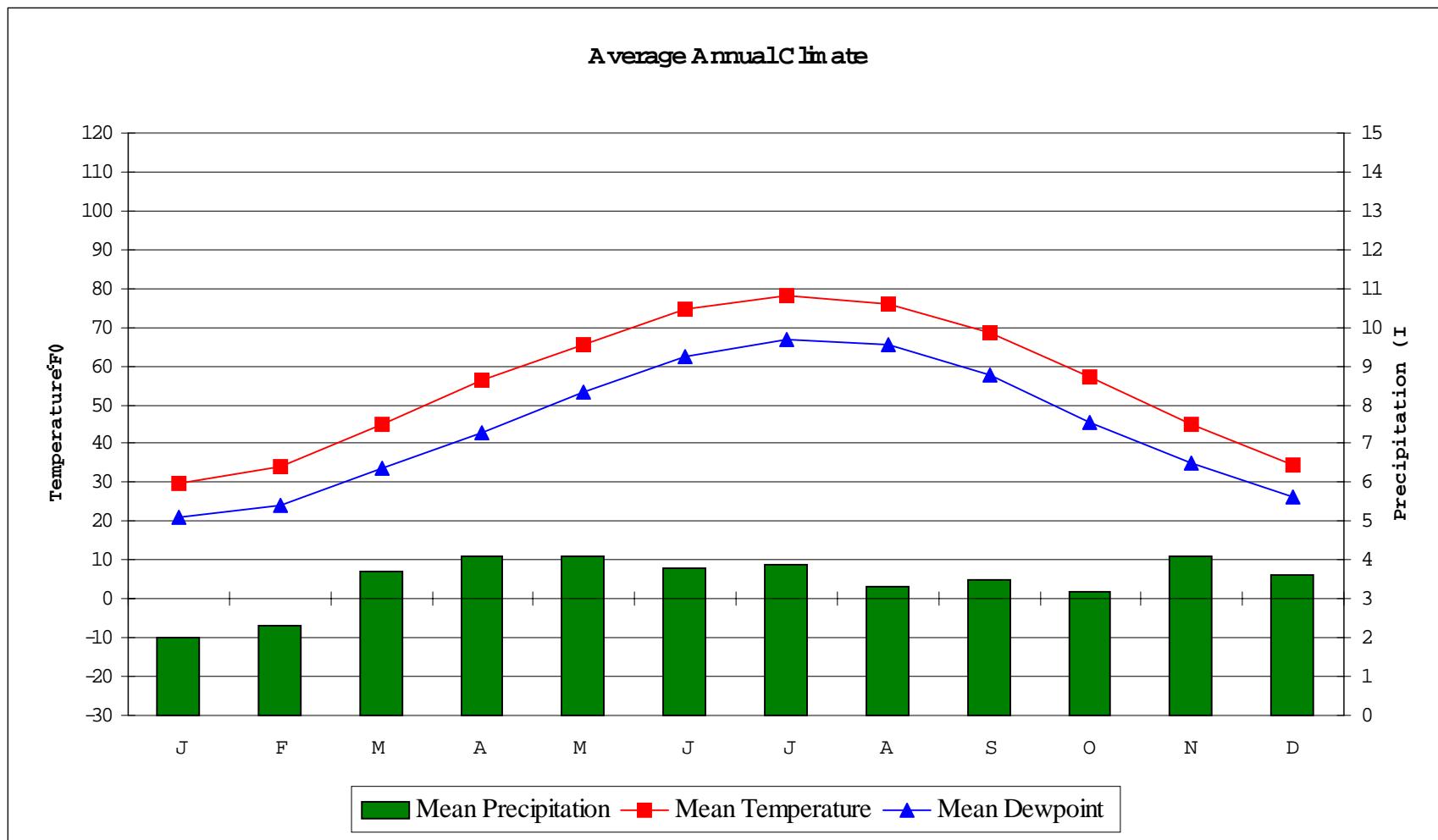
1.9.2. With averages displayed by month, it is relatively easy to comprehend seasonal variation of each variable, and also understand which specific months are likely to be hot or cold; humid or dry, or have high precipitation. This can be helpful for mission planning, as well as for planning construction and building operation.

**Cautionary Note:** This graph displays averages, not extreme values. Data shown should not be used to size equipment or building envelopes for peak loads. Peak load data appears on page 1 of each station record in this handbook.

Figure 1.2. Sample Data Set Page 2.

SCOTT AFB/BELLEVILLE IL

WMO No. 724338



**Section 1C—Data Set Page 3, 30-Year Psychometric Summary****1.10. Explanation of Graph:**

1.10.1. The graph displays the joint cumulative percent frequency of temperature and humidity ratio. Hourly observations are binned into groups of 5 °F and 10 grains per pound (gr/lb) (or 3 °C and 1.5 grams per kilogram [g/kg]), centered on each value of temperature or humidity ratio. For example, the 70 °F temperature bin collects all observations between 67.5 °F and 72.5 °F. The bin is depicted as a gridline on the chart; the vertical lines represent the temperature bins and the horizontal lines represent the humidity ratio bins. The intersection of temperature and humidity ratio lines represent a further sub-setting of the observations into groups meeting both temperature and humidity ratio criteria. For example, the intersection of the 70 °F bin line and the 40 gr/lb bin line represent the observations when temperature was between 67.5 °F and 72.4 °F and the humidity ratio was between 35 gr/lb and 44 gr/lb. Thus, a joint-frequency table is created for all temperature and humidity ratio bin combinations.

**Cautionary Note:** The psychrometric graph is intended as a visual tool only. Its purpose is to allow quick visual comparison between climates at different locations. Extrapolation of data directly from the graph is not advised due to the approximate plotting routine used to generate the graph from the BIN data. This is evident where values of humidity appear past their saturation point. This discrepancy between the actual data and the graph is the result of the plotting routine used to generate the graph and not from errors in the original hourly data used to create the binned summary.

1.10.2. The contours on this chart represent the areas containing 99%, 97.5%, 95%, 80%, and 50% of all observations (cumulative percent frequency or percentiles). The contours are centered on the most frequently occurring bins (50% contour), spreading outward until almost all observations (99%) are grouped. Contours are defined by calculating a percent frequency for each bin (relative to the others), and then accumulating these percent frequencies (from most frequent to least frequent) until the 50% value is passed, and thus the first set of bins is grouped. The accumulating continues until the 80% value is passed, and the second group of bins is grouped. This continues until the 95%, 97.5%, and 99% values are passed.

1.10.3. Thus, the least frequent (most extreme) bins, which when accumulated amount to less than 1% of the total observations, are outside of the 99% contour. Any bins outside the 99% contour thus have either not occurred, or have occurred so infrequently that they should not be taken into consideration for sizing equipment.

**1.11. Suggestions for Use:**

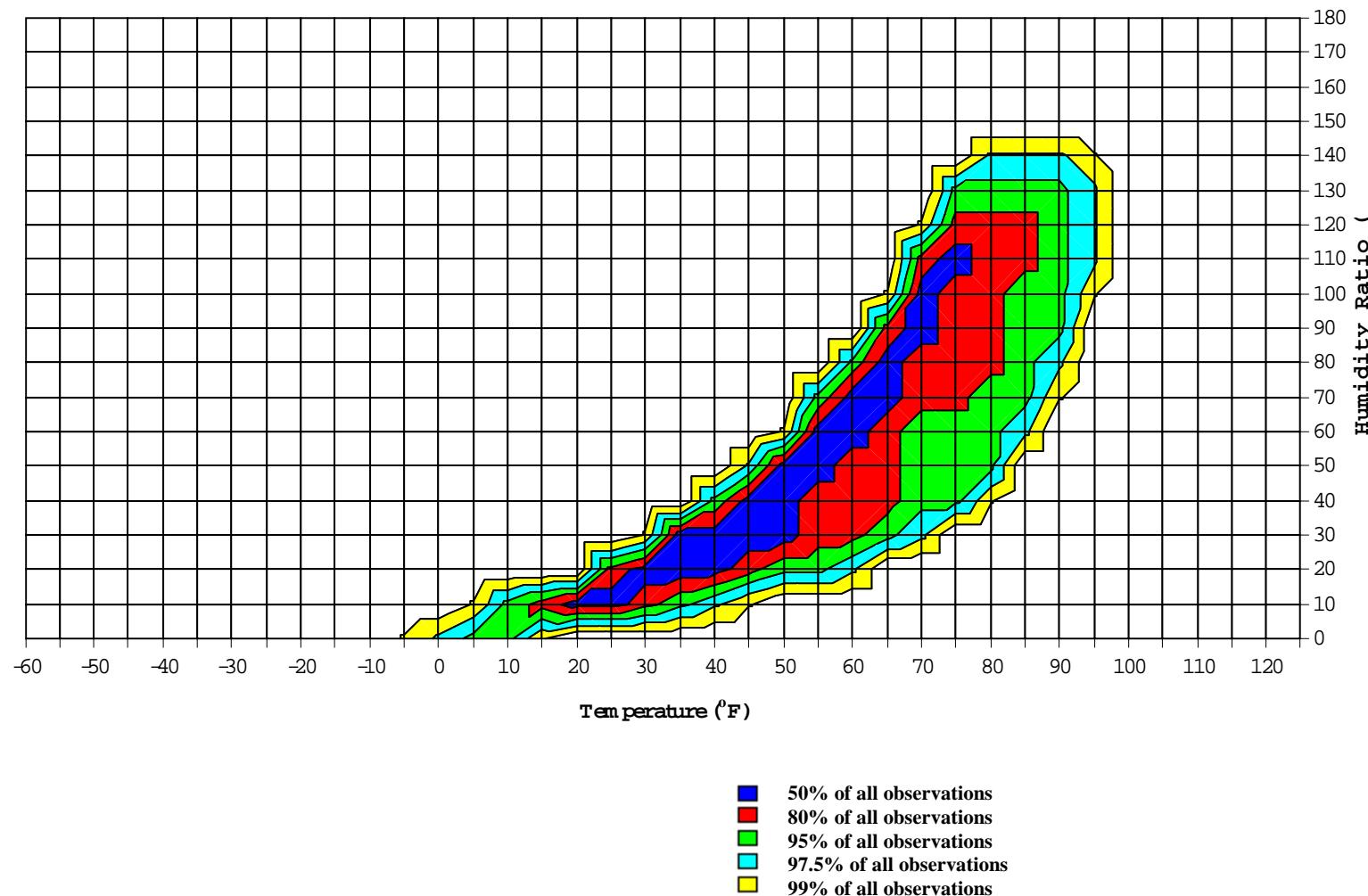
1.11.1. This graphic displays the long-term history of temperature and moisture at each station (a total of 262,800 hourly observations if the POR is 30 years and if the data is complete over that period). The engineer can use this graph to ascertain the most common temperature and moisture conditions which will be encountered over the operating life of mechanical equipment.

1.11.2. It is often useful to calculate the behavior of the proposed system at “most-common” conditions, in addition to the traditional peak design calculations. This will help ensure that the selected equipment and controls are capable of modulation and control at all points of operation rather than simply at extreme conditions.

Figure 1.3. Sample Data Set Page 3.

SCOTT AFB/BELLEVILLE IL

WMO No. 724338

**Long Term Psychrometric Summary**

**Section 1D—Data Set Page 4, Psychrometric Display of Design Values**

**1.12. Explanation of Chart.** Similar to Page 3, this chart depicts the saturation curve (when RH = 100%) along with peak design values. The design values are calculated as in the table on Page 1, but this chart shows their relationships graphically, depicting their position relative to each other and relative to the saturation curve.

1.12.1. Above and to the left of saturation curve, RH would be greater than 100 percent (not possible). The area below and to the right of the curve (including the points on the curve itself) represent the area where RH is less than or equal to 100 percent, and thus where all observations occur. Note that since the humidity ratio is a function of pressure, and pressure varies with elevation, different sites will have different saturation curves.

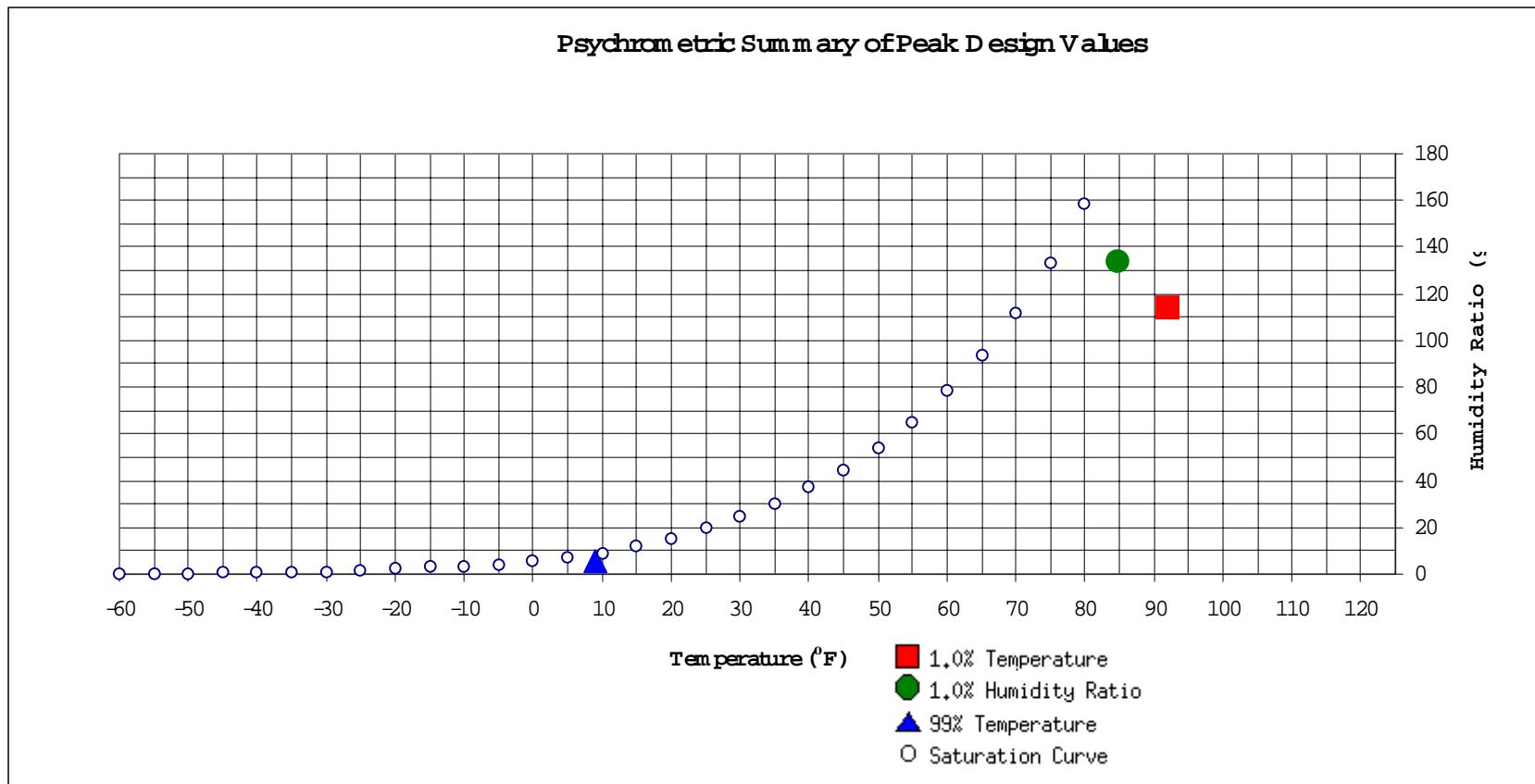
1.12.2. The dry bulb temperature is the horizontal coordinate on this scatter plot, and the humidity ratio is the vertical coordinate. Peak design values are depicted by the red square (1.0% Dry Bulb Temperature), the green circle (1.0% Humidity Ratio), and the blue diamond (99% Dry Bulb Temperature).

1.12.3. The table below the chart shows the exact values of 99% dry bulb temp, 1.0% humidity ratio, and 1.0% dry bulb temperature, along with calculated values of enthalpy, mean coincident wet bulb temperature, and humidity ratio (as applicable). The value of enthalpy coincident to each temperature/humidity ratio is created using the psychometric functions provided by the Linric Company, Bedford, New Hampshire. The dry bulb temperature and humidity ratio are used to calculate enthalpy using the Linric algorithms.

Figure 1.4. Sample Data Set Page 4.

SCOTT AFB/BELLEVILLE IL

WMO No. 724338



	MCHR (°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	MCDB (gr/lb)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)	
<b>99% Dry Bulb</b>	9	5.6	3.0		133.7	84.8	77.6	75	41.3

	MCHR (°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
<b>1.0% Dry Bulb</b>	92	113.8	76.3	40.0

**Section 1E—Data Set Pages 5-9, Binned Temperature Data**

**1.13. Explanation of Tables.** Identical to those in AFM 88-29, these tables show the number of hours that temperatures in 5 °F (3 °C) bins occur during a given month, and during 8-hour periods during the days of that month. The 8-hour periods are based upon a 24-hour clock and displayed in Local Standard Time (LST). The total numbers of observations (hours) in each temperature bin are summed horizontally in the “Total Obs” column for the month. The mean coincident wet bulb temperature is the mean value of all those wet bulb temperatures that occur coincidentally with the dry bulb temperatures in the particular 5-degree temperature interval. At the upper or warmer end of the mean coincident wet bulb distribution, the values occasionally reverse their trend because the highest wet bulb temperatures do not necessarily occur with the highest dry bulb temperatures. There are thirteen such tables, one for each month, and one representing the overall annual summary (Data Set Page 9).

**1.14. Suggestions for Use.** Binned summaries are used by many different technical disciplines for different purposes. They are useful in making informal estimates of energy consumption by cooling and heating equipment, and for gaining a general understanding of patterns of temperature and moisture at different times of the day, month, and year.

**Cautionary Note:** Do not use these binned summaries to calculate moisture loads.

**1.15. Comments:**

1.15.1. These particular binned summaries are based on the dry bulb temperature. After each of the one-hour observations has been placed into a dry bulb bin, the average humidity ratio is calculated for all observations in each bin. Consequently, dry bulb bins underestimate the magnitude of dehumidification and humidification loads, because the averaging calculation “flattens” the peaks and valleys of humidity ratios. The amount of the underestimation varies according to the desired humidity control level.

Figure 1.5. Sample Data Set Pages 5-9.

SCOTT AFB/BELLEVILLE IL WMO No. 724338

**Dry-Bulb Temperature Hours For An Average Year (Sheet 1 of 5)**  
**Period of Record = 1967 to 1996**

Temperature Range (°F)	January						February						March							
	Hour Group (LST)			M C W B Total Obs (°F)	Hour Group (LST)															
	01 To 08	09 To 16	17 To 00		01 To 08	09 To 16	17 To 00		01 To 08	09 To 16	17 To 00		01 To 08	09 To 16	17 To 00		01 To 08	09 To 16	17 To 00	
100 / 104																	0	0	0	65.0
95 / 99																	3	0	3	64.4
90 / 94																				
85 / 89																	6	1	7	62.2
80 / 84																				
75 / 79																	0	0	0	60.7
70 / 74																	2	0	2	58.2
65 / 69	0	1	0	2	58.0												4	1	5	54.8
60 / 64	1	4	1	6	54.6												1	8	4	13
55 / 59	2	7	4	13	51.7												4	12	8	24
50 / 54	4	11	7	22	46.9												5	15	11	31
45 / 49	5	18	12	35	42.1												9	22	19	50
40 / 44	17	30	26	72	38.1												22	33	29	84
35 / 39	34	38	40	112	33.7												39	38	41	119
30 / 34	51	42	51	143	29.5												42	30	39	111
25 / 29	35	34	34	102	24.5												37	25	28	90
20 / 24	32	24	28	84	19.7												21	16	17	54
15 / 19	25	18	21	64	15.1												15	9	13	37
10 / 14	18	10	13	41	10.4												14	7	8	29
5 / 9	12	6	7	26	5.7												9	2	4	15
0 / 4	7	3	4	13	0.9												4	1	1	6
-5 / -1	3	1	1	5	-3.3												1	0	0	1
-10 / -6	2	0	0	2	-7.4												1	0	0	-7.9
-15 / -11	0	0	0	1	-12.7												0		0	-11.4
-20 / -16	0	0	0	0	-16.9															

**Caution:** This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

**Figure 1.5. Sample Data Set Pages 5-9 (Continued).**

**SCOTT AFB/BELLEVILLE IL**                    WMO No. 724338  
**Dry-Bulb Temperature Hours For An Average Year (Sheet 2 of 5)**  
**Period of Record = 1967 to 1996**

Temperature Range (°F)	April						May						June								
	Hour Group (LST)			M C	Hour Group (LST)			M C	Hour Group (LST)			M C	Hour Group (LST)			M C					
	01 To 08	09 To 16	17 To 00		W B	01 To 08	09 To 16		W B	01 To 08	09 To 16		W B	01 To 08	09 To 16		W B				
	Total Obs	(°F)	Total Obs		W B	Total Obs	(°F)		W B	Total Obs	(°F)		W B	Total Obs	(°F)		W B				
100 / 104																	1	0	1	75.6	
95 / 99																	4	1	5	75.6	
90 / 94	1	0	1	70.9					4	1	4	72.7					0	28	8	35	75.1
85 / 89	3	1	4	67.7					18	4	22	70.6					1	54	21	76	73.1
80 / 84	13	3	16	65.8					0	34	13	47	68.2				9	60	40	109	70.5
75 / 79	0	20	9	29	63.9				5	43	27	75	65.7				32	47	55	134	68.6
70 / 74	4	28	19	52	60.8				19	49	42	110	63.2				68	29	56	153	66.6
65 / 69	13	34	31	78	58.1				46	43	51	140	60.5				60	11	34	105	62.8
60 / 64	31	39	36	105	54.7				55	32	46	134	56.8				41	5	18	64	58.4
55 / 59	34	35	41	109	50.5				48	18	35	100	52.6				21	1	5	28	54.3
50 / 54	41	30	37	107	46.5				37	5	21	63	48.1				6		1	7	49.7
45 / 49	46	21	30	97	42.4				27	2	7	36	43.9				1			1	46.3
40 / 44	35	12	20	66	38.1				8	0	2	10	39.2								
35 / 39	21	4	9	34	33.8				3		0	3	35.1								
30 / 34	13	1	4	18	29.8				0			0	30.8								
25 / 29	3	0	0	3	25.3																
20 / 24	0			0	21.5																
15 / 19																					
10 / 14																					
5 / 9																					
0 / 4																					
-5 / -1																					
-10 / -6																					
-15 / -11																					
-20 / -16																					

**Caution:** This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Figure 1.5. Sample Data Set Pages 5-9 (Continued).

**SCOTT AFB/BELLEVILLE IL** WMO No. 724338  
**Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)**  
**Period of Record = 1967 to 1996**

Temperature Range (°F)	July						August						September					
	Hour Group (LST)			M C	Hour Group (LST)			M C	Hour Group (LST)			M C	Hour Group (LST)			M C		
	01	09	17		W	01	09		W	01	09		W	01	09			
	To	To	To	Total Obs	(°F)	To	To	Total Obs	(°F)	To	To	Total Obs	(°F)	To	To	Total Obs	W	B
	08	16	00			08	16	00		08	16	00		08	16	00		(°F)
100 / 104		2	0	2	77.5		1	0	1	77.8								
95 / 99		14	3	18	77.9		10	1	12	78.4				2	0	2	76.7	
90 / 94	0	49	15	64	76.9		35	8	43	77.1				11	2	12	75.1	
85 / 89	2	68	31	102	74.6	1	61	21	83	74.3	0	28	6	34	72.6			
80 / 84	19	63	56	138	72.6	9	65	45	118	72.0	1	46	17	64	70.0			
75 / 79	63	34	67	163	71.1	43	46	64	153	70.6	11	48	35	94	68.1			
70 / 74	86	14	48	149	68.3	76	25	60	160	67.8	41	44	51	137	65.7			
65 / 69	48	3	20	71	63.7	61	6	32	99	63.5	46	30	44	120	61.8			
60 / 64	22	1	6	29	58.9	38	1	13	52	59.2	46	18	38	103	57.6			
55 / 59	7		1	8	54.8	16	0	3	19	54.9	42	8	27	77	53.4			
50 / 54	1		0	1	51.2	3		0	4	50.4	30	3	14	47	49.1			
45 / 49						0		0	0	45.8	16	0	5	21	44.9			
40 / 44											6		2	7	40.2			
35 / 39											1		0	2	36.1			
30 / 34											0			0	31.5			
25 / 29																		
20 / 24																		
15 / 19																		
10 / 14																		
5 / 9																		
0 / 4																		
-5 / -1																		
-10 / -6																		
-15 / -11																		
-20 / -16																		

**Caution:** This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

**Figure 1.5. Sample Data Set Pages 5-9 (Continued).**

**SCOTT AFB/BELLEVILLE IL**                    WMO No. 724338  
**Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)**  
**Period of Record = 1967 to 1996**

Temperature Range (°F)	October						November						December						
	Hour Group (LST)			M C	Hour Group (LST)			M C	Hour Group (LST)			M C	Hour Group (LST)			M C			
	01 To 08	09 To 16	17 To 00		W B	01 To 08	09 To 16		W B	01 To 08	09 To 16		W B	01 To 08	09 To 16		W B		
	Total Obs	(°F)	Total Obs		W B	Total Obs	(°F)		W B	Total Obs	(°F)		W B	Total Obs	(°F)		Total Obs	(°F)	
100 / 104																			
95 / 99																			
90 / 94		0				0													
85 / 89		4				4													
80 / 84		13				13													
75 / 79		1				1													
70 / 74		26				26													
65 / 69		6				6													
60 / 64		33				33													
55 / 59		91				91													
50 / 54		57				57													
45 / 49		62.1				62.1													
40 / 44		0				0													
35 / 39		8				8													
30 / 34		33				33													
25 / 29		113				113													
20 / 24		47.1				47.1													
15 / 19		23				23													
10 / 14		1				1													
5 / 9		8				8													
0 / 4		34.6				34.6													
-5 / -1		44				44													
-10 / -6		31				31													
-15 / -11		41				41													
-20 / -16		117				117													
		33.7				33.7													
		42				42													
		48				48													
		50				50													
		140				140													
		33.9				33.9													
		48				48													
		140				140													
		29.5				29.5													
		52				52													
		41				41													
		140				140													
		29.5				29.5													
		34				34													
		96				96													
		24.7				24.7													
		17				17													
		54				54													
		20.1				20.1													
		9				9													
		33				33													
		15.4				15.4													
		6				6													
		6				6													
		20				20													
		10.6				10.6													
		3				3													
		10				10													
		5.9				5.9													
		2				2													
		6				6													
		1.2				1.2													
		3				3													
		-3.5				-3.5													
		1				1													
		2				2													
		-7.3				-7.3													
		0				0													
		0				0													
		1				1													
		-12.0				-12.0													

**Caution:** This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Figure 1.5. Sample Data Set Pages 5-9 (Continued).

**SCOTT AFB/BELLEVILLE IL**                    WMO No. 724338  
**Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)**  
**Period of Record = 1967 to 1996**

Temperature Range (°F)	Annual Totals					
	Hour Group (LST)			Total Obs	M	C
	01 To 08	09 To 16	17 To 00		W	B
<b>100 / 104</b>		3	0	3	77.1	
<b>95 / 99</b>		31	5	37	77.7	
<b>90 / 94</b>	0	127	32	160	76.3	
<b>85 / 89</b>	4	236	84	325	73.5	
<b>80 / 84</b>	37	296	176	509	70.8	
<b>75 / 79</b>	154	274	263	690	68.7	
<b>70 / 74</b>	298	247	303	848	65.7	
<b>65 / 69</b>	296	207	267	770	61.1	
<b>60 / 64</b>	288	201	241	730	56.5	
<b>55 / 59</b>	246	184	224	654	51.8	
<b>50 / 54</b>	223	175	205	602	47.0	
<b>45 / 49</b>	228	179	197	603	42.7	
<b>40 / 44</b>	227	192	211	631	38.1	
<b>35 / 39</b>	250	192	224	667	33.8	
<b>30 / 34</b>	251	146	199	596	29.4	
<b>25 / 29</b>	163	95	120	379	24.6	
<b>20 / 24</b>	99	54	69	222	19.9	
<b>15 / 19</b>	63	36	46	145	15.2	
<b>10 / 14</b>	43	24	28	95	10.5	
<b>5 / 9</b>	26	11	14	51	5.9	
<b>0 / 4</b>	14	5	7	25	1.1	
<b>-5 / -1</b>	6	2	2	10	-3.3	
<b>-10 / -6</b>	3	1	1	6	-7.5	
<b>-15 / -11</b>	1	0	0	2	-12.2	
<b>-20 / -16</b>	0		0	0	-16.9	

**Caution:** This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

**Section 1F—Data Set Page 10, Annual Temperature Summary**

**1.16. Explanation of Chart.** This chart shows a week-by-week summary of dry bulb temperatures for the given site. The observations are grouped into seven-day periods (approximate calendar weeks). For example, observations from 1-7 January from all years are grouped, 8-14 January are grouped, and so on, overlapping the end of one month and beginning of the next month where necessary. For each of the seven-day periods, the following statistics are shown.

1.16.1. *1% Temperature* is the dry bulb temperature that is exceeded one percent of the time during that calendar week.

1.16.2. *MCWB @ 1% Temp* is the mean of wet bulb temperatures coincident with 1% dry bulb temperatures during the same week

1.16.3. *Mean Max Temp* is the daily maximum dry bulb temperature, averaged by week over the POR.

1.16.4. *Mean Min Temp* is the daily minimum dry bulb temperature, averaged by week over the POR.

1.16.5. *99% Temp* is the daily dry bulb temperature that is at or above this value 99 percent of the time, or below this value one percent of the time.

**Note:** The information in this chart is calculated on a weekly basis; information on a climate summary (Data Set Page 1) is calculated on an annual basis.

**1.17. Suggestions for Use.** The weekly 1% and 99% temperatures are useful for understanding the probable temperature extremes that can occur during a given week of the year. The weekly dry bulb temperatures are useful for understanding the change of seasons at a given location. The display is helpful for mission planning and construction project planning.

**1.18. Cautionary Notes:**

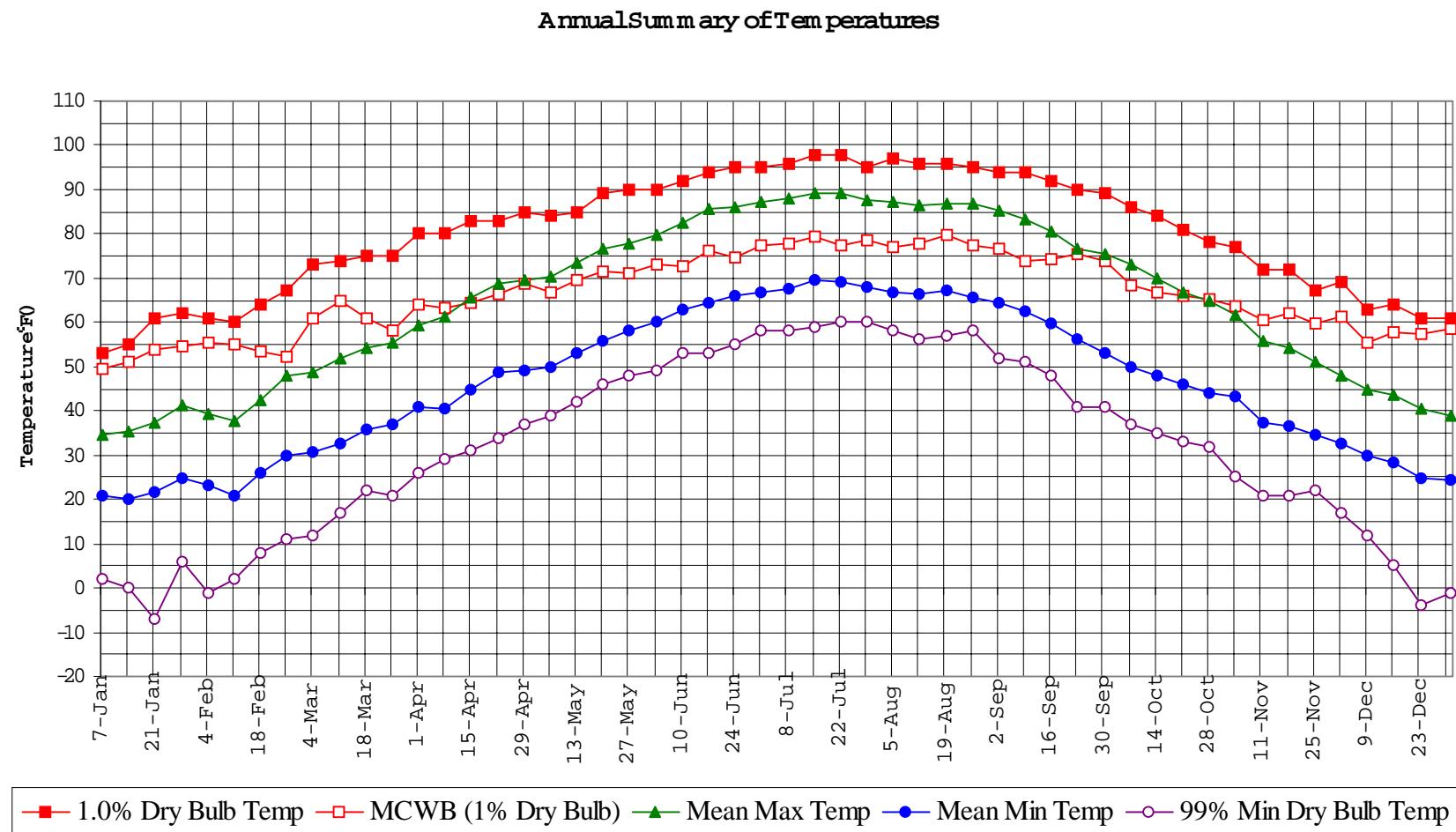
1.18.1. Designers. The values displayed here are based on the 30-year record. It is important that designers NOT base equipment selection on the “highest” or “lowest” recorded temperature at the station. That error would result in selecting equipment extremely costly to install, which would operate inefficiently for all but the very hottest or coldest single hour in 30 years. See the design criteria data page (Page 1) in this handbook for appropriate maximum and minimum temperatures for sizing equipment.

1.18.2. Construction and Operation Planners. The mean maximum and minimum temperatures shown for each week seldom occur in the same year. Keep in mind these are mean values useful for understanding the typical range of temperatures in a given week. The difference does NOT represent the actual day-night temperature swing in a given week.

Figure 1.6. Sample Data Set Page 10.

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**Section 1G—Data Set Page 11, Annual Humidity Summary**

**1.19. Explanation of Chart.** Similar to the annual temperature summary (Data Set Page 10), this chart depicts mean maximum and minimum values of humidity ratio, plus the 1% maximum humidity ratio, along with its mean coincident dry bulb temperature, summarized by calendar week. The chart uses two vertical axes: On the left are the humidity ratio values and on the right is a temperature scale for the mean coincident dry bulb temperature.

**1.20. Suggestions for Use.** Weekly humidity ratios are useful for understanding the change of seasons at a given location, and the probable high and low moisture levels during a given week of the year. The display is helpful for planning humidity-controlled storage projects, and for understanding factors contributing to atmospheric corrosion. Humidity also affects the deterioration rate of building materials and weathering of military equipment and structures exposed to the elements.

**1.21. Cautionary Notes:**

1.21.1. Designers. The values displayed here are based on the 30-year record. It is important that designers NOT base equipment selection on the “highest” or “lowest” recorded humidity at the station. That error would result in selecting oversized equipment, which would increase costs and may result in control problems at other than extreme conditions. Use design values on Data Set Page 1 for equipment sizing.

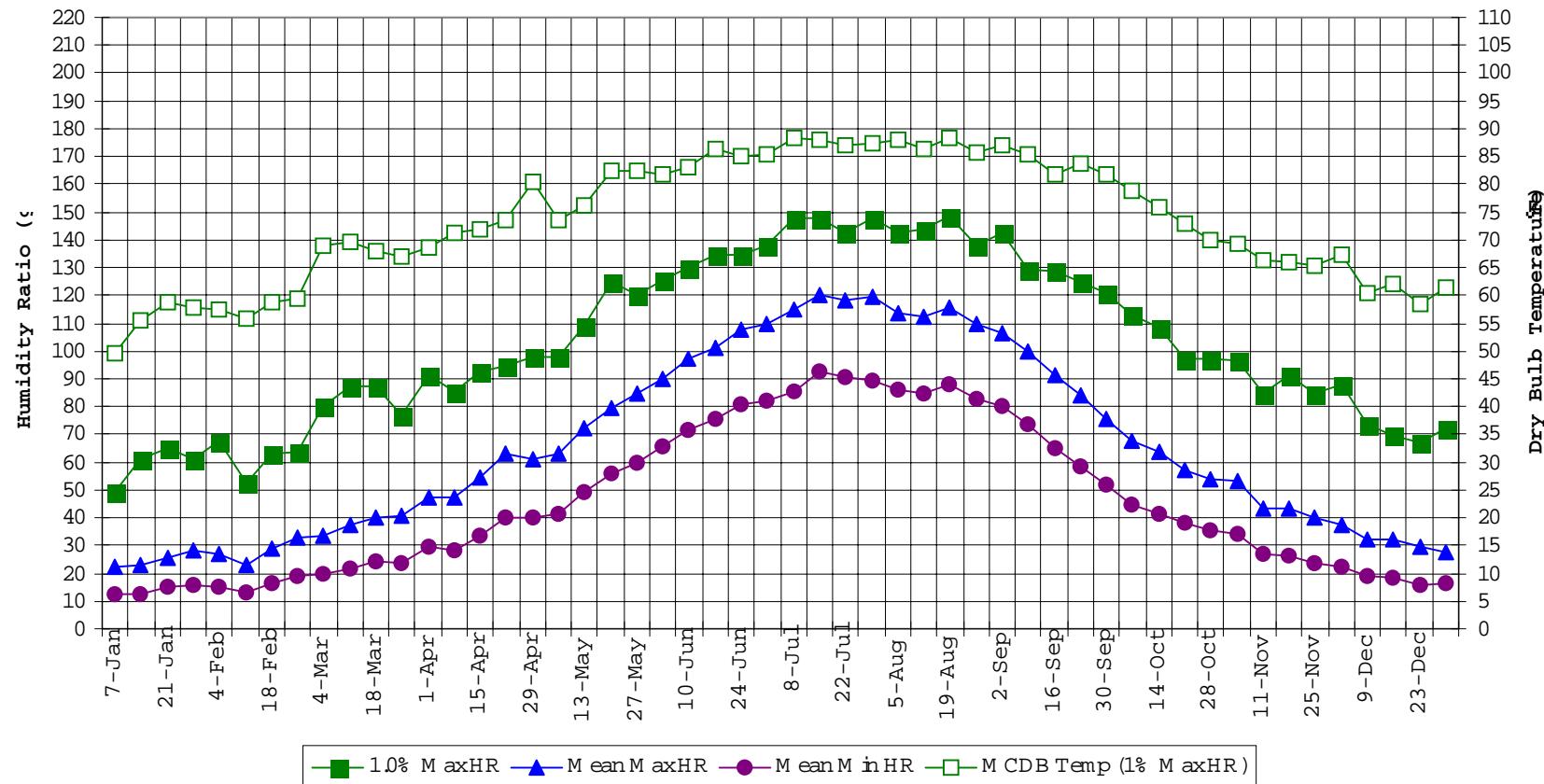
1.21.2. Construction and Operation Planners. The high and low humidity ratios shown for each week seldom occur in the same year. Keep in mind that these are mean values that are useful for understanding the typical range of humidity ratio in a given week. The difference does NOT represent the actual day-night humidity ratio swing in a given week.

Figure 1.7. Sample Data Set Page 11.

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## Long Term Humidity and Dry Bulb Temperature Summary



**Section 1H—Data Set Page 12, Annual Dry Bulb Temperature and Humidity Summary Tables**

**1.22. Explanation of Tables.** These tables show the values used to plot the charts on Data Set Pages 10 and 11. The left half of the table uses Data Set Page 10 and the right half uses Data Set Page 11.

**Figure 1.8. Sample Data Set Page 12.**

**SCOTT AFB/BELLEVILLE IL**                   **WMO No. 724338**  
**Long Term Dry Bulb Temperature and Humidity Summary**

Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	53.0	49.4	34.7	20.9	2.0	49.0	49.6	22.6	12.8
14-Jan	55.0	50.9	35.2	20.1	0.0	60.9	55.6	22.7	12.2
21-Jan	61.0	53.8	37.2	21.7	-7.0	65.1	58.9	25.8	14.8
28-Jan	62.0	54.6	41.4	24.9	6.0	60.9	57.9	28.2	15.8
4-Feb	61.0	55.4	39.2	23.1	-1.0	67.9	57.4	26.6	15.4
11-Feb	60.0	55.2	37.7	21.0	2.0	52.5	55.8	23.2	13.1
18-Feb	64.0	53.6	42.4	25.9	8.0	63.0	58.8	28.6	16.7
25-Feb	67.0	52.4	47.9	30.0	11.0	63.7	59.4	32.8	19.2
4-Mar	73.0	61.1	48.6	30.6	12.0	79.8	69.1	33.3	19.8
11-Mar	74.0	64.8	51.7	32.5	17.0	87.5	69.5	37.5	21.9
18-Mar	75.0	61.0	54.4	35.6	22.0	87.5	68.1	40.2	24.1
25-Mar	75.0	58.3	55.6	36.9	21.0	77.0	67.0	40.6	24.0
1-Apr	80.0	64.0	59.3	40.8	26.0	91.0	68.6	47.2	29.8
8-Apr	80.0	63.3	61.4	40.6	29.0	85.4	71.3	47.3	28.0
15-Apr	83.0	64.4	65.5	44.9	31.0	92.4	71.8	54.6	33.7
22-Apr	83.0	66.4	68.8	48.7	34.0	94.5	73.4	62.9	39.9
29-Apr	85.0	68.9	69.5	49.1	37.0	98.0	80.3	61.4	39.9
6-May	84.0	66.9	70.3	49.9	39.0	98.0	73.7	63.2	41.2
13-May	85.0	69.5	73.6	53.2	42.0	109.2	76.3	72.6	49.5
20-May	89.0	71.6	76.6	55.6	46.0	124.6	82.5	79.7	55.6
27-May	90.0	71.3	77.9	58.1	48.0	120.4	82.3	84.5	59.9
3-Jun	90.0	72.9	79.7	60.1	49.0	125.3	81.8	90.1	65.4
10-Jun	92.0	72.7	82.7	62.9	53.0	130.2	83.2	97.4	71.8
17-Jun	94.0	76.0	85.6	64.4	53.0	134.4	86.4	100.9	75.5
24-Jun	95.0	74.8	86.2	66.0	55.0	134.4	85.0	107.7	80.7
1-Jul	95.0	77.5	87.3	66.8	58.0	137.9	85.3	109.6	82.2
8-Jul	96.0	77.8	88.0	67.7	58.0	147.7	88.4	114.8	85.5
15-Jul	98.0	79.3	89.0	69.6	59.0	147.7	87.9	119.9	92.4
22-Jul	98.0	77.3	89.0	69.0	60.0	142.8	86.9	117.9	90.8
29-Jul	95.0	78.7	87.6	68.2	60.0	147.7	87.2	119.4	89.2
5-Aug	97.0	76.9	87.0	66.8	58.0	142.8	88.1	113.5	86.0
12-Aug	96.0	77.7	86.4	66.4	56.0	143.5	86.4	112.6	84.9
19-Aug	96.0	79.6	86.8	67.0	57.0	148.4	88.2	115.6	88.3
26-Aug	95.0	77.6	86.7	65.6	58.0	137.9	85.6	109.9	82.6
2-Sep	94.0	76.6	85.1	64.5	52.0	142.8	87.1	106.3	80.3
9-Sep	94.0	73.9	83.3	62.5	51.0	129.5	85.4	99.7	73.6
16-Sep	92.0	74.3	80.5	59.6	48.0	128.8	81.6	91.1	65.2
23-Sep	90.0	75.6	76.7	56.0	41.0	124.6	83.7	84.0	58.2
30-Sep	89.0	74.1	75.5	53.1	41.0	121.1	81.9	75.5	52.0
7-Oct	86.0	68.4	73.1	49.8	37.0	112.7	78.9	67.9	44.9
14-Oct	84.0	66.7	69.9	47.8	35.0	108.5	76.0	63.9	41.7
21-Oct	81.0	66.1	66.7	45.9	33.0	97.3	73.0	57.4	37.9
28-Oct	78.0	65.1	64.7	44.2	32.0	97.3	69.8	54.1	35.5
4-Nov	77.0	63.6	61.6	43.1	25.0	96.6	69.3	53.3	34.1
11-Nov	72.0	60.5	55.9	37.3	21.0	84.7	66.5	43.0	26.6
18-Nov	72.0	62.1	54.4	36.8	21.0	91.0	66.0	43.4	26.5
25-Nov	67.0	59.6	51.3	34.7	22.0	84.7	65.4	40.4	23.6
2-Dec	69.0	61.3	48.0	32.7	17.0	88.2	67.2	37.7	22.1
9-Dec	63.0	55.5	44.9	29.9	12.0	73.5	60.5	32.2	19.3
16-Dec	64.0	57.9	43.7	28.3	5.0	69.3	62.2	32.0	18.5
23-Dec	61.0	57.4	40.3	24.6	-4.0	67.2	58.4	29.3	15.9
31-Dec	61.0	58.5	38.9	24.6	-1.0	72.1	61.4	27.7	16.4

*Section II—Data Set Page 13, Building Envelope Loads***1.23. Explanation of Charts:**

1.23.1. Cooling degree-days are derived by multiplying the number of hours that the outdoor temperature is above 65 °F (18 °C) times the number of degrees of that temperature difference. For example, if one hour was observed at a temperature of 78 °F, that observation adds 13 degree-hours to the annual total. The sum of the degree-hours is divided by 24 to yield degree-days.

1.23.2. Heating degree-days are calculated similarly, against an inside temperature of 65 °F. [So a one-hour observation of 62 °F adds 3 degree-hours to the annual total. Heating degree-days are summed separately from the cooling degree-days. Hot and cold hours do not cancel each other out, as both heating and cooling conditions may occur over the course of a given day.]

**1.24. Suggestions for Use.** Degree-days are used to estimate the sensible heat and sensible cooling loads on the building envelope. Degree-day loads can be used to estimate the annual energy consumption of a building, provided that the loads from ventilation and infiltration air are also considered (see Section 1J, Data Set Page 14).

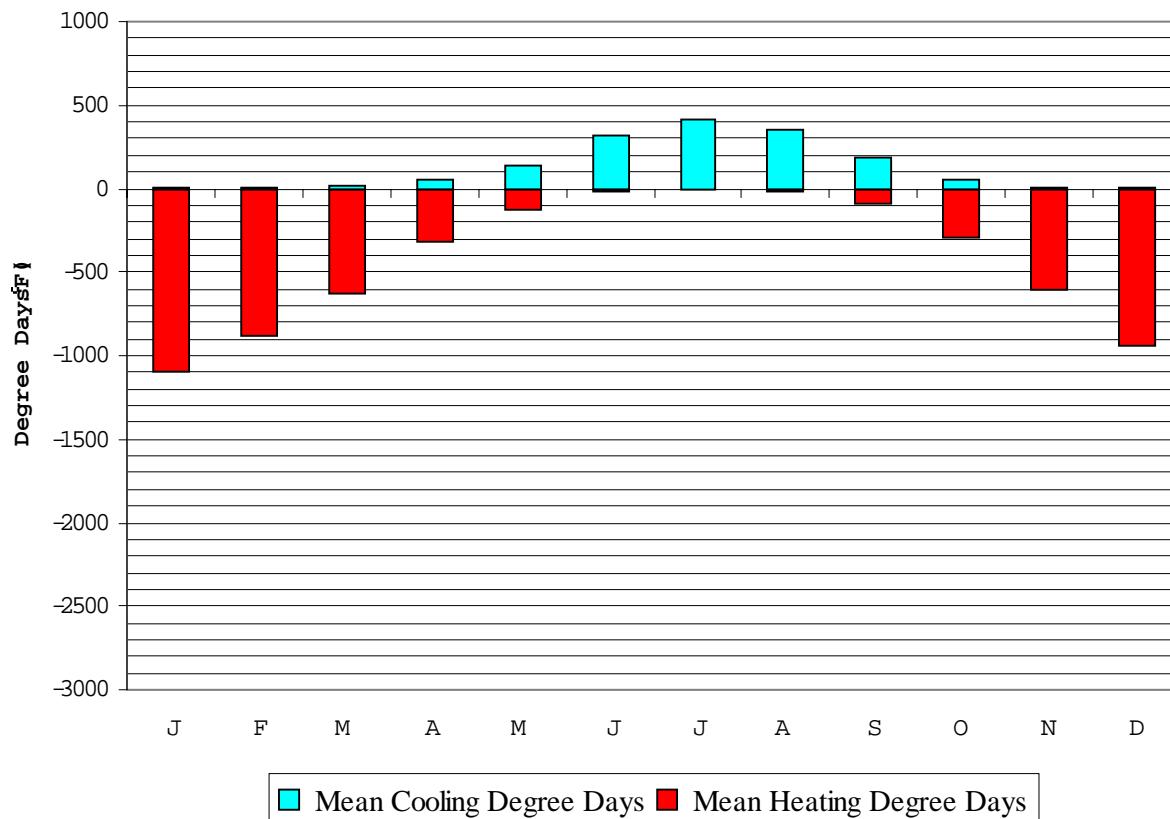
**Figure 1.9. Sample Data Set Page 13.**

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**D egree D ays, H eatin g and C ooling**

(Base 65°F)



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	1094
FEB	1	879
MAR	13	634
APR	50	312
MAY	137	122
JUN	314	21
JUL	418	6
AUG	354	14
SEP	188	87
OCT	52	298
NOV	7	608
DEC	0	942
ANN	1534	5017

**Section 1J—Data Set Page 14, Ventilation and Infiltration Loads****1.25. Explanation of Charts:**

1.25.1. The graph and table display the independent loads imposed by heating, cooling, humidifying, and dehumidifying outside air as it is brought into a building. The calculation assumes that air inside the building is maintained at conditions between 68 °F (20 °C)/30% RH and 75 °F (24 °C)/60% RH. For the purposes of these calculations, when the outside air is within that range of temperature and moisture, any incoming air is assumed not to impose any load.

1.25.2. These values are calculated with the methodology used to calculate the annual VCLI Index on page one, except that values on this page are computed by month, and the result is displayed as British thermal units (Btu) per cubic foot per minute (cfm) rather than as ton-hours per cfm per year. The heating and humidifying loads are shown as negative values. Cooling and dehumidifying loads are displayed as positive values.

**1.26. Suggestions for Use.** Bringing fresh ventilation air into a building, or allowing air to infiltrate into buildings through cracks imposes heating, cooling, dehumidification, and humidification loads on the mechanical system. This display helps the architect, engineers, and operating personnel understand the nature and magnitude of those loads on an annual basis. It also shows how the loads vary from month to month throughout the year.

**1.27. Comments.** These calculations are based on the load created when one cubic foot of fresh air is brought into the building each minute. The results of the calculation include the moisture load or deficit, and the sensible heat load or deficit created by that cubic foot of air during each month of the year. Note that most months have both a load and a deficit for temperature and moisture. The monthly deficit and load do not “cancel” from the perspective of the mechanical system, because temperature and moisture loads will often occur at different times of the day.

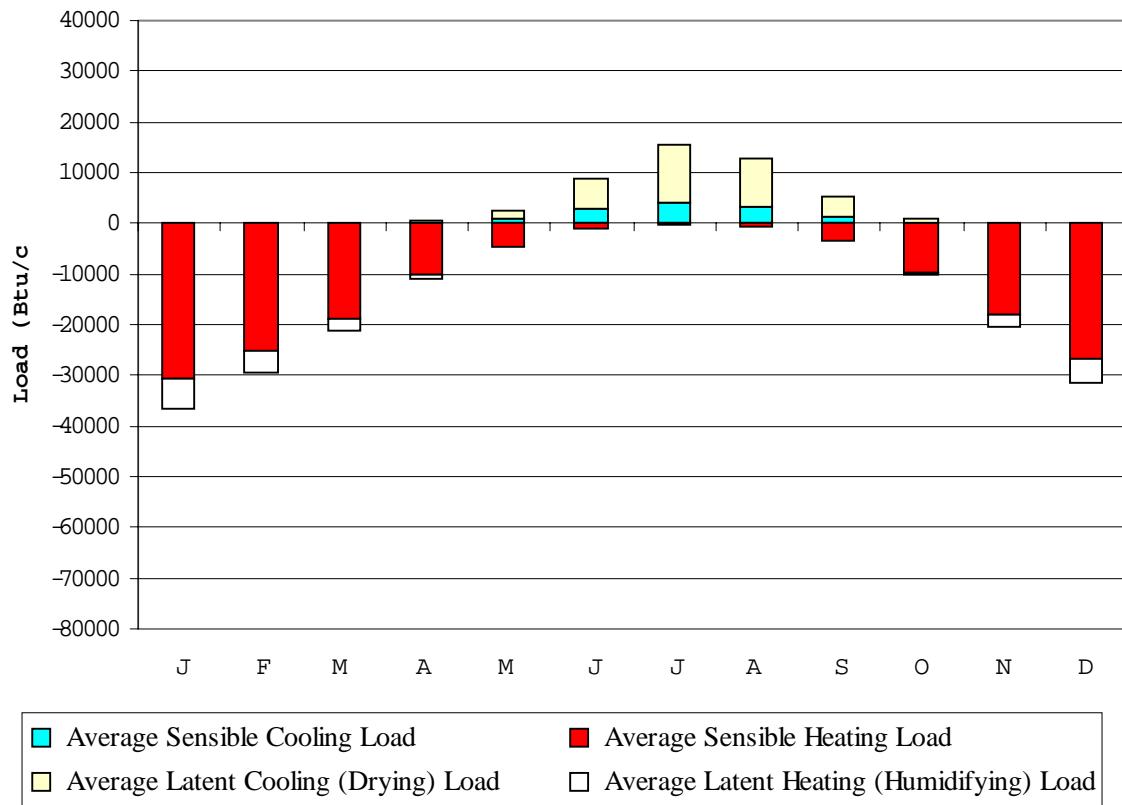
**Cautionary Note:** The values displayed here assume that the inside air is maintained between 68 °F/30% RH and 75 °F, 60% RH. If the inside conditions are held in a different range of temperature or moisture, the loads will be different. For example, in calculating loads for humidity-controlled, but unheated storage, the loads vary according to the change in both temperature and humidity, since the inside temperature varies, but the inside humidity is held constant. For estimating loads in that or similar applications, the engineer may obtain better results from using the average maximum weekly humidity data shown on sample pages 11 and 12.

**Figure 1.10. Sample Data Set Page 14.**

SCOTT AFB/BELLEVILLE IL

WMO No. 724338

**Average Ventilation and Infiltration Loads**  
**(Outside Air vs. 75°F, 60% RH summer; 68°F, 30% RH winter)**



■ Average Sensible Cooling Load	■ Average Sensible Heating Load
□ Average Latent Cooling (Drying) Load	□ Average Latent Heating (Humidifying) Load

	Average Sensible Cooling Load (Btu/cfm)	Average Sensible Heating Load (Btu/cfm)	Average Latent Cooling Load (Btu/cfm)	Average Latent Heating Load (Btu/cfm)
JAN	0	-30775	1	-5940
FEB	0	-24966	3	-4532
MAR	34	-18713	57	-2613
APR	227	-9959	222	-826
MAY	843	-4462	1787	-87
JUN	2828	-981	6087	-1
JUL	4255	-341	11159	0
AUG	3285	-705	9343	0
SEP	1350	-3230	3729	-24
OCT	215	-9619	515	-527
NOV	8	-18010	85	-2268
DEC	0	-26811	10	-4609
ANN	13045	-148572	32998	-21427

**Section 1K—Data Set Pages 15-16, Solar Radiation Data****1.28. Explanation of Charts:**

1.28.1. This data is reproduced courtesy of the National Renewable Energy Laboratory (NREL). The data were first published in their *Solar Radiation Data Manual for Buildings* (1995). The user should refer to that publication for a complete description of how to use this data.

1.28.2. The site used in each station record is the nearest NREL-published site available within a 1.5° latitude radius from the desired location. Therefore, some sites may be several miles away, and in some cases the NREL location may be in a neighboring state. Caution should be used when the nearest site available is not in the same city as the desired location, as significant differences in cloud climatology can exist over short distances.

1.28.3. When this handbook was prepared, the only sites available from NREL were Alaska, Hawaii Puerto Rico, Guam, and the 50 states. These pages are blank at locations where solar radiation data is not available. For these locations, users may wish to contact NREL directly to obtain advice concerning data not published in the NREL solar radiation data manual.

**1.29. Suggestions for Use.** The solar data presented here can be used for calculating solar radiation cooling loads on building envelopes, and also for estimating the value of solar illumination for daylighting calculations. Again, the user should refer to the *Solar Radiation Data Manual for Buildings* for a complete description of how to use this data.

**Cautionary Note:** The data source for the NREL reports comes from the National Solar Radiation Database — not the data set used to calculate peak design values and other monthly temperature and moisture data in this handbook. The two data sets will differ for many reasons, including different periods of record, measurement locations, sampling methodology and frequency, and differences in calculation methodology. Consequently, the user should expect differences in degree-days, min/max temperatures, and humidities between this data and that calculated by the AFCCC. For design criteria, use the temperature and moisture values presented on the Design Criteria Data page of this handbook. These were calculated more recently, and used a longer POR. Also, they are taken from records at DoD locations rather than from civilian locations near — but not always identical to — the military data collection points.

**Figure 1.11. Sample Data Set Pages 15-16.**

**Average Annual Solar Radiation – Nearest Available Site**  
 (Source: National Renewable Energy Laboratory, Golden CO, 1995)

City: ST. LOUIS  
 State: MO  
 WBAN No: 13994  
 Lat(N): 38.75  
 Long(W): 90.38  
 Elev(ft): 564

Stn Type: Secondary

SHADING GEOMETRY IN DIMENSIONLESS UNITS

Window: 1  
 Overhang: 0.498  
 Vert Gap: 0.314

AVERAGE INCIDENT SOLAR RADIATION (Btu/sq.ft./day), Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ	Global	690	930	1230	1590	1860	2030	2020	1800	1460	1100	720	580	1340
	Std Dev	56	69	98	135	138	114	120	110	112	98	69	57	42
	Minimum	550	800	1060	1370	1550	1830	1750	1570	1190	870	590	490	1280
	Maximum	780	1070	1430	1930	2180	2350	2240	1960	1690	1250	870	710	1480
	Diffuse	340	460	590	710	810	840	810	730	600	430	350	300	580
Clear Day	Global	950	1300	1760	2230	2520	2630	2550	2290	1870	1400	1000	840	1780
NORTH	Global	210	280	360	440	550	630	600	490	380	290	220	190	390
	Diffuse	210	280	360	430	500	530	520	460	380	290	220	190	370
Clear Day	Global	190	250	330	430	580	680	630	470	360	270	200	170	380
EAST	Global	460	590	750	920	1060	1140	1130	1050	880	710	470	390	800
	Diffuse	260	340	440	530	600	640	620	570	470	360	270	230	440
Clear Day	Global	710	910	1150	1340	1440	1460	1430	1340	1170	940	730	640	1110
SOUTH	Global	1080	1110	1060	970	830	780	820	950	1110	1220	1020	940	990
	Diffuse	370	440	500	540	560	570	570	560	520	440	360	330	480
Clear Day	Global	1930	1970	1770	1380	1040	890	950	1210	1580	1840	1870	1860	1520
WEST	Global	470	600	740	920	1040	1110	1120	1030	880	700	480	390	790
	Diffuse	260	340	440	530	610	650	630	580	480	360	270	230	450
Clear Day	Global	710	910	1150	1340	1440	1460	1430	1340	1170	940	730	640	1110

Figure 1.11. Sample Data Set Pages 15-16 (Continued).

**Average Annual Solar Heat and Illumination – Nearest Available Site**  
 (Source: National Renewable Energy Laboratory, Golden CO, 1995)

AVERAGE TRANSMITTED SOLAR RADIATION (Btu/sq.ft./day) FOR DOUBLE GLAZING, Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ.	Unshaded	450	640	870	1150	1350	1480	1470	1300	1040	770	480	370	950
	Unshaded	150	190	250	300	370	410	390	330	260	200	150	130	260
NORTH	Shaded	130	170	220	270	330	370	350	300	240	180	140	110	230
	Unshaded	320	410	530	660	750	810	810	750	620	500	320	270	560
EAST	Shaded	290	370	470	570	650	700	700	650	550	450	290	240	490
	Unshaded	810	810	740	630	510	470	490	600	750	870	760	700	680
SOUTH	Shaded	790	750	590	420	350	360	360	390	550	770	730	680	560
	Unshaded	320	420	520	650	740	790	800	740	620	490	330	270	560
WEST	Unshaded	290	370	460	570	640	680	690	640	550	440	300	240	490
	Shaded													

AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS, Percentage Uncertainty = 9												
March												
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm	
HORIZ.	M.Clear	40	73	82	64	26	48	84	101	96	67	
	M.Cloudy	23	45	52	40	16	32	61	76	71	49	
NORTH	M.Clear	10	14	15	13	8	19	16	17	17	15	
	M.Cloudy	9	16	17	14	7	15	18	19	19	16	
EAST	M.Clear	75	56	15	13	8	78	72	31	17	15	
	M.Cloudy	25	30	17	14	7	40	49	27	19	16	
SOUTH	M.Clear	40	73	82	64	26	12	31	45	41	19	
	M.Cloudy	17	36	43	32	12	12	26	37	33	18	
WEST	M.Clear	10	14	24	67	64	12	16	17	53	78	
	M.Cloudy	9	16	21	33	22	12	18	19	41	50	
M.Clear	(% hrs)	32	28	27	28	29	43	39	32	29	34	
Sept												
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm	
HORIZ.	M.Clear	29	68	86	78	47	16	42	48	30	2	
	M.Cloudy	17	42	58	53	31	9	25	28	17	2	
NORTH	M.Clear	9	14	16	15	12	6	10	11	8	1	
	M.Cloudy	7	15	18	17	12	4	10	11	7	1	
EAST	M.Clear	65	70	28	15	12	42	39	11	8	1	
	M.Cloudy	23	36	23	17	12	11	18	11	7	1	
SOUTH	M.Clear	21	57	75	67	37	39	82	88	63	6	
	M.Cloudy	11	31	45	41	21	10	29	32	20	2	
WEST	M.Clear	9	14	16	54	74	6	10	22	50	9	
	M.Cloudy	7	15	18	35	35	4	10	14	17	2	
M.Clear	(% hrs)	47	47	41	41	43	31	30	30	30	32	
June												
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm	

## **Section 1L—Data Set Pages 17-18, Wind Summary**

### **1.30. Explanation of Charts:**

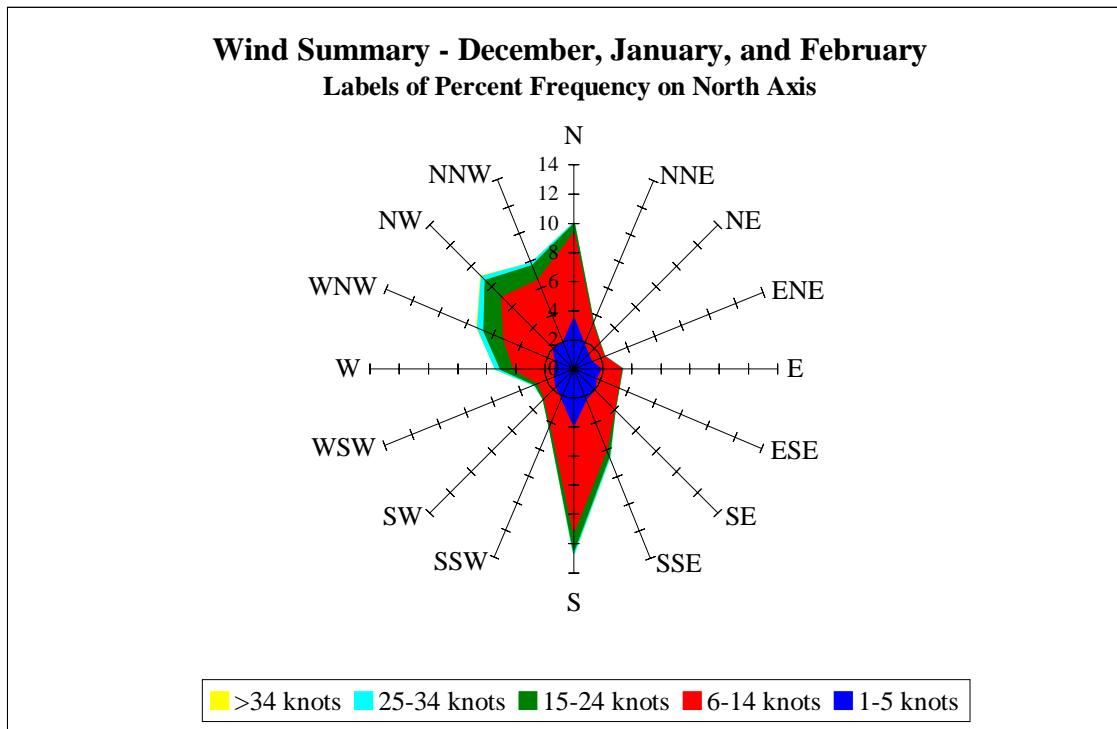
1.30.1. These charts depict the frequency of different wind direction and wind speed combinations. The observations are binned into the sixteen cardinal compass directions and five speed categories (1-5 knots, 6-14 knots, 15-24 knots, 25-34 knots, and greater than 34 knots). The frequency of direction and the tick marks indicating that value lie along each ‘spoke’ of the wind chart. The wind speed bins for each direction are color-coded by the legend at the bottom of the chart.

1.30.2. To determine the percent frequency of a particular wind direction, look for the tick mark bounding the outer edge of a colored (wind speed) area. In the case of the first wind speed bin (1-5 knots), the percent frequency is simply the value of the tick mark on the outer edge of the 1-5 knot region. For the higher speed bins (6-14 knots or greater), subtract the earlier spoke values from the value shown to get the frequency for the speed bin in question.

1.30.3. The values for percent frequency have been summed by direction, so to determine the total percent frequency for all speeds from a particular direction, look up the tick mark (or interpolated value) bounding the outermost colored area along that spoke. That tick mark represents the total percent frequency of wind from that direction.

1.30.4. Since the calm condition has no direction, the percent occurrence of calm conditions is displayed immediately below the chart.

**1.31. Sample Wind Summary Chart.** The wind summary charts are prepared by three-month seasons, over all hours (December, January, February for northern hemisphere winter or southern hemisphere summer; March, April, May for northern hemisphere spring or southern hemisphere fall, and so on). See the following sample wind summary chart for an example of determining percent frequencies.



Percent Calm = 12.82

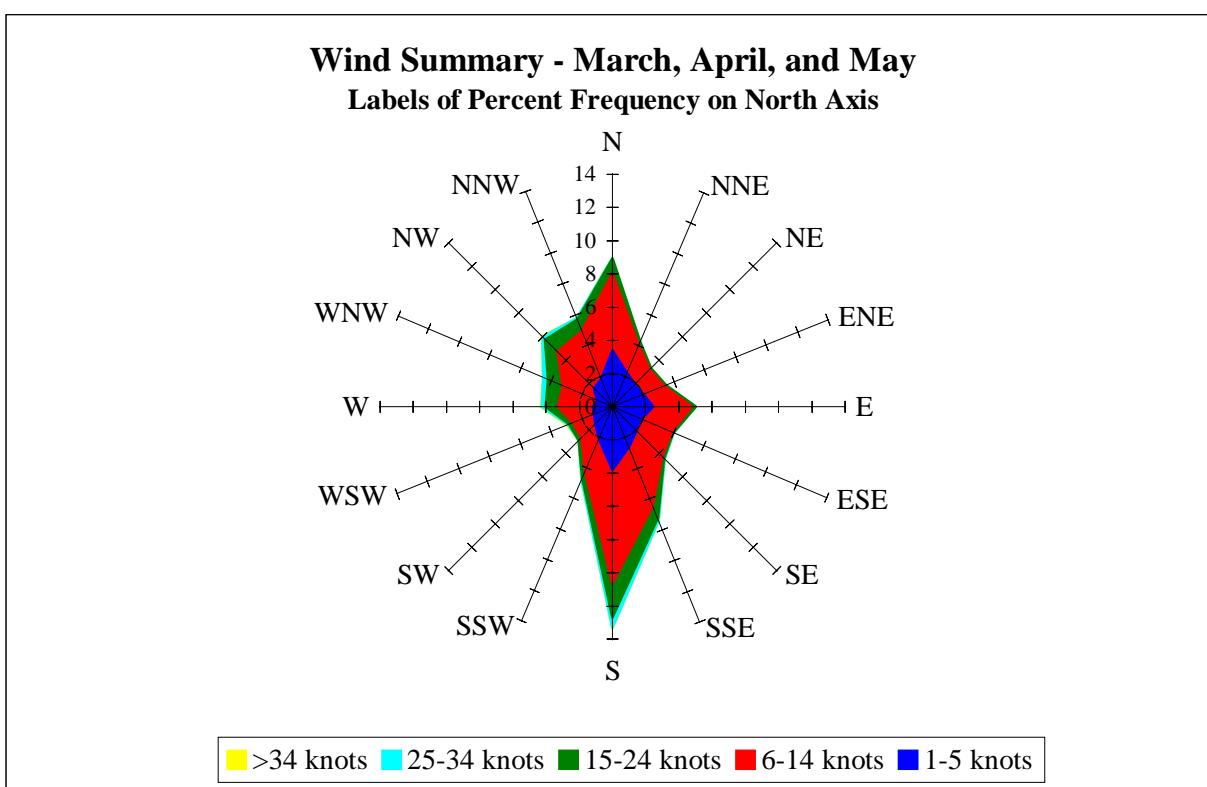
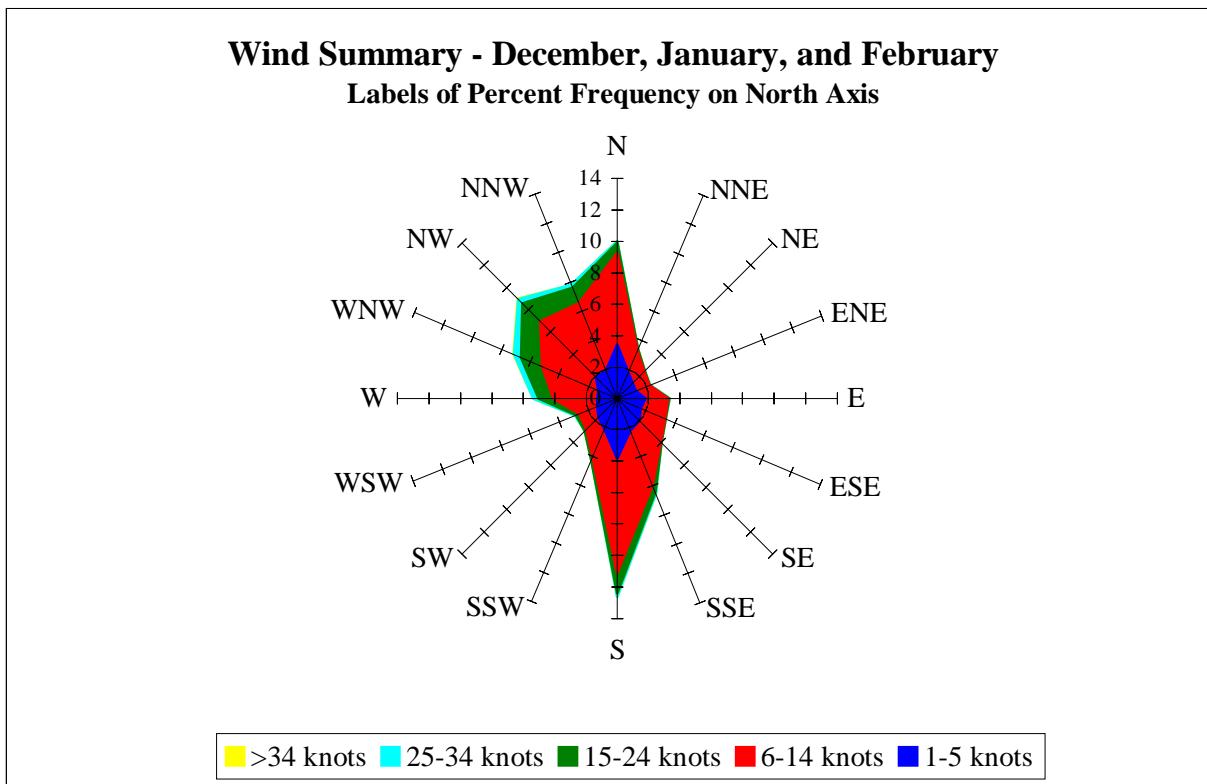
1.31.1. From the above sample wind summary chart, the percent frequency of wind between 1-5 knots and from the north (N) is about 3%. The percent frequency of wind between 6-14 knots and from the northwest (NW) is about 5% (7% - 2%). The percent frequency of all wind speeds from the south (S) is about 12%. The percent frequency of all wind directions from the west through north (W, WNW, NW, NNW, and N) is about 38% (5% + 7% + 8% + 8% + 10%, respectively). It is easy to determine that wind speeds greater than 34 knots almost never occur (or are such a small frequency from any direction), because the colored area (yellow) is not shown or is indistinguishable because it is so small.

1.31.2 The percent of time the wind is calm is indicated in the lower left corner of the chart -- in this case, 12.82%. When the outermost value from each of the 16 directions are summed and added to the percent calm, the result is 100% (allowing for rounding). Occurrences of variable wind direction are omitted from the sample before computing percent frequency by direction.

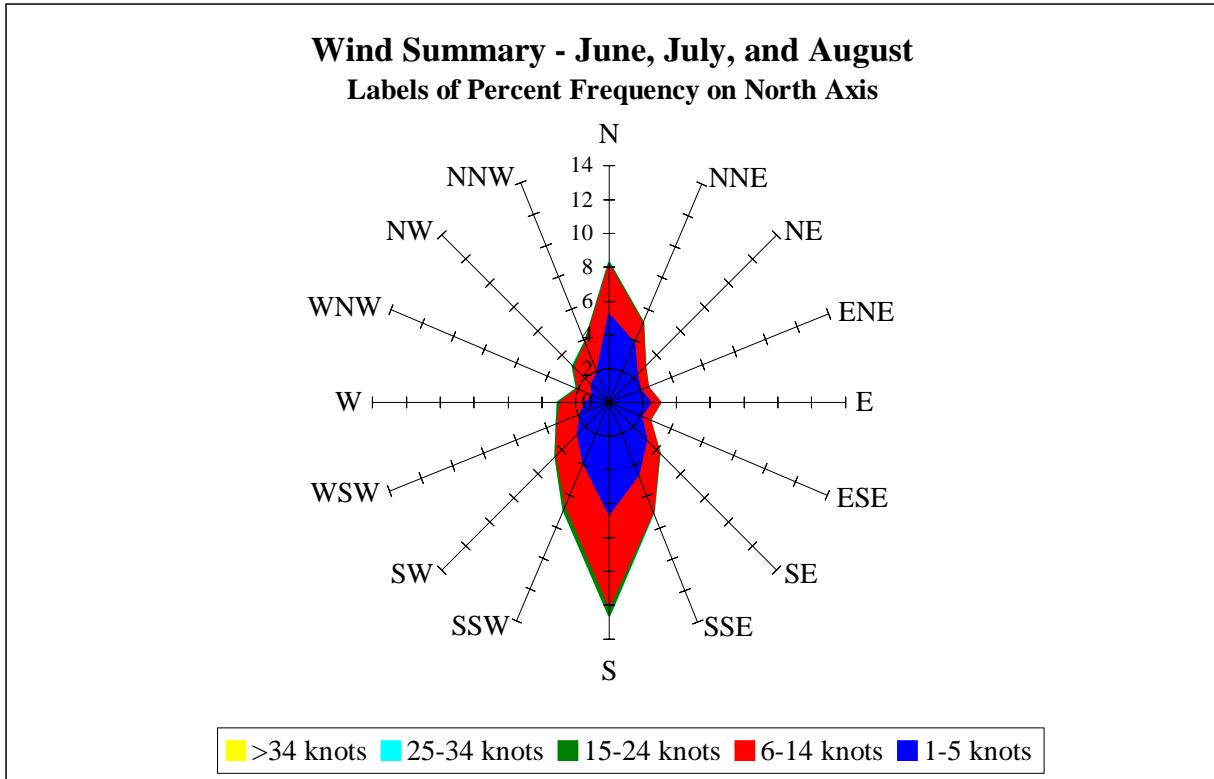
**1.32. Suggestions for Use.** Knowing the probable wind speed and direction in a particular month can be helpful in construction and mission planning as well as in designing structures which must face severe wind-driven rain or drifting snow. Engineers designing heating and air conditioning systems which draw fresh air from the weather, and exhaust-contaminated building air can use these data to minimize the potential for cross-contamination between supply and exhaust air streams. Also, when accumulation on roofs of drifting snow is likely, this information can be helpful for locating inlet and exhaust ducts so they are less likely to be covered by snowdrifts.

**Cautionary Note:** The wind currents around any building are strongly affected by the geometry of the building and the topography of the site as well as any surrounding buildings. The wind data used for these wind summaries are typical of flat and open airfields, where there are no obstructions near the observation point.

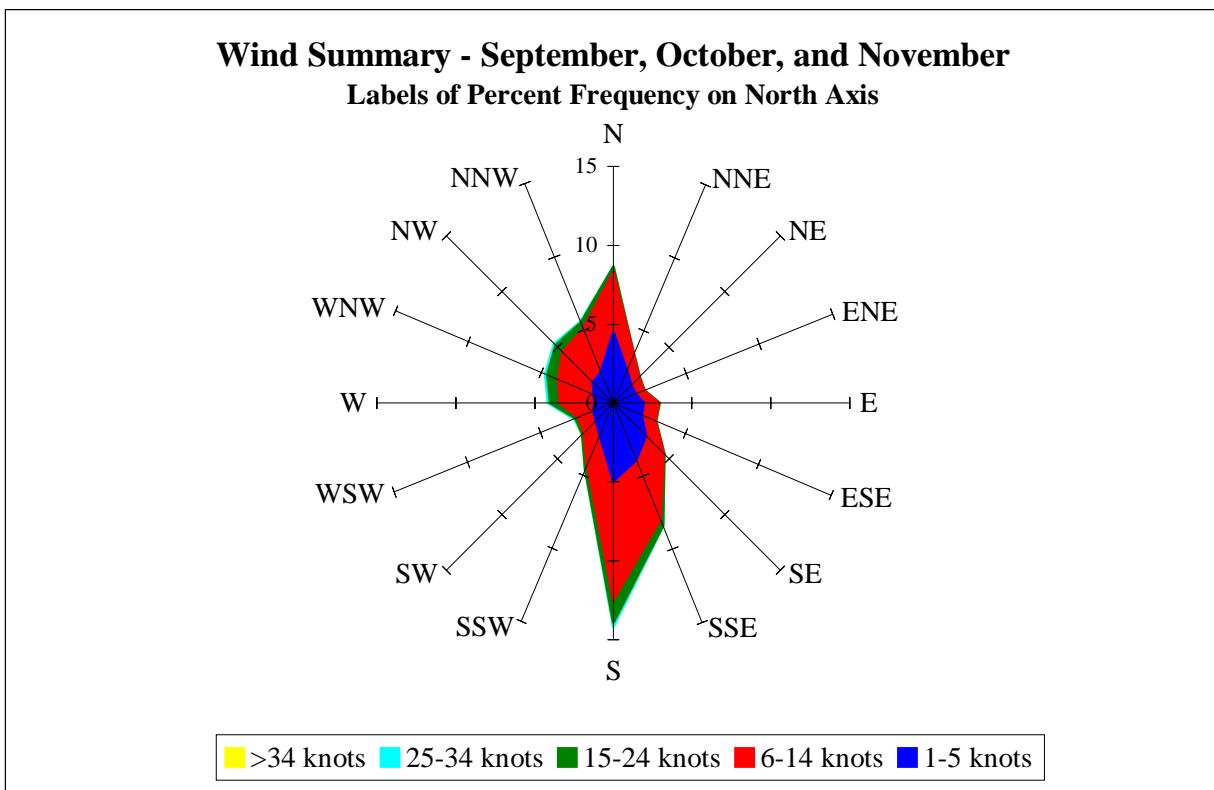
Figure 1.12. Sample Data Set Pages 17-18.



Percent Calm = 14.93



Percent Calm = 25.11



Percent Calm = 20.73

## Chapter 2

### SITE DATA

**Note:** Site names have been updated, incorporating DoD installation closures through 1997. Site data sets retain the site name used in AFM 88-22 (as applied by WMO) for ease of reference.

#### *Section 2A—US Sites (50 States, Territories)*

<b>ALABAMA</b>					
Anniston/Calhoun	722287	33.58N	85.85W	IP	SI
<b>Birmingham</b>	<b>722280</b>	<b>33.57N</b>	<b>86.75W</b>	<b>IP</b>	<b>SI</b>
Dothan	722268	31.32N	85.45W	IP	SI
<b>Huntsville/Madison</b>	<b>723230</b>	<b>34.65N</b>	<b>86.77W</b>	<b>IP</b>	<b>SI</b>
<b>Maxwell AFB/Montgomery</b>	<b>722265</b>	<b>32.38N</b>	<b>86.37W</b>	<b>IP</b>	<b>SI</b>
Mobile/Bates	722230	30.68N	88.25W	IP	SI
Montgomery/Dannelly	722260	32.30N	86.4W	IP	SI
Muscle Shoals	723235	34.75N	87.62W	IP	SI
<b>Ozark (formerly Cairns AAF)</b>	<b>722269</b>	<b>31.28N</b>	<b>85.72W</b>	<b>IP</b>	<b>SI</b>
Tuscaloosa	722286	33.22N	87.62W	IP	SI
<b>ALASKA</b>					
<b>Adak Island (formerly Adak NAS)/Mitchell</b>	<b>704540</b>	<b>51.88N</b>	<b>176.6W</b>	<b>IP</b>	<b>SI</b>
Anchorage	702730	61.17N	150W	IP	SI
Anchorage/Merrill	702735	61.22N	149.8W	IP	SI
Aniak	702320	61.58N	159.5W	IP	SI
Annette Island	703980	55.03N	131.5W	IP	SI
<b>Barrow/Post-Rogers</b>	<b>700260</b>	<b>71.30N</b>	<b>156.7W</b>	<b>IP</b>	<b>SI</b>
Barter Island	700860	70.13N	143.6W	IP	SI
Bethel	702190	60.78N	161.8W	IP	SI
Bettles Field	701740	66.92N	151.5W	IP	SI
Cape Lisburne	701040	68.88N	166.1W	IP	SI
Cape Newenham	703050	58.65N	162W	IP	SI
Cape Romanzoff	702120	61.78N	166W	IP	SI
Cold Bay	703160	55.20N	162.70W	IP	SI
Cordova/Mile 13	702960	60.5N	145.5W	IP	SI
Dutch Harbor	704890	53.9N	166.5W	IP	SI
<b>Eielson</b>	<b>702650</b>	<b>64.67N</b>	<b>147.1W</b>	<b>IP</b>	<b>SI</b>
<b>Elmendorf AFB</b>	<b>702720</b>	<b>61.25N</b>	<b>149.8W</b>	<b>IP</b>	<b>SI</b>
Fairbanks	702610	64.82N	147.8W	IP	SI
Fort Greely (formerly Allen AAF)	702670	6.4N	145.7W	IP	SI
Fort Richardson/Bryn	702700	61.27N	149.6W	IP	SI
Fort Yukon	701940	66.57N	145.2W	IP	SI
Galena	702220	64.73N	156.9W	IP	SI
Gulkana	702710	62.15N	145.4W	IP	SI
Homer	703410	59.63N	151.5W	IP	SI
Iliamna	703400	59.75N	154.9W	IP	SI

Indian Mountain (formerly AFS)	701730	66N	153.7W	IP	SI
<b>Juneau</b>	<b>703810</b>	<b>58.37N</b>	<b>134.5W</b>	<b>IP</b>	<b>SI</b>
Kenai	702590	60.57N	151.2W	IP	SI
King Salmon	703260	58.68N	156.6W	IP	SI
<b>Kodiak</b>	<b>703500</b>	<b>57.75N</b>	<b>152.5W</b>	<b>IP</b>	<b>SI</b>
Kotzebue/Ralph Wien	701330	66.87N	162.6W	IP	SI
McGrath	702310	62.97N	155.6W	IP	SI
Middleton Island	703430	59.43N	146.3W	IP	SI
Nenana	702600	64.55N	149W	IP	SI
<b>Nome</b>	<b>702000</b>	<b>64.5N</b>	<b>165.4W</b>	<b>IP</b>	<b>SI</b>
Northway	702910	62.97N	141.9W	IP	SI
Port Heiden	703330	56.95N	158.6W	IP	SI
Saint Paul Island	703080	57.15N	170.2W	IP	SI
Shemya/Eareckson AFS	704140	52.72N	174.12E	IP	SI
Sitka/Japonski	703710	57.07N	135.3W	IP	SI
Sparrevohn	702350	61.1N	155.5W	IP	SI
Tatalina AFS	702315	62.9N	155.9W	IP	SI
Tin City (formerly AFS)	701170	65.57N	167.9W	IP	SI
Unalakleet	702070	63.88N	160.8W	IP	SI
Whittier	702757	60.77N	148.6W	IP	SI
Yakutat	703610	59.52N	139.6W	IP	SI

**ARIZONA**

<b>Davis-Monthan AFB</b>	<b>722745</b>	<b>32.17N</b>	<b>110.8W</b>	<b>IP</b>	<b>SI</b>
<b>Flagstaff</b>	<b>723755</b>	<b>35.13N</b>	<b>111.6W</b>	<b>IP</b>	<b>SI</b>
<b>Fort Huachuca/Libby</b>	<b>722730</b>	<b>31.6N</b>	<b>110.3W</b>	<b>IP</b>	<b>SI</b>
<b>Luke AFB/Phoenix</b>	<b>722785</b>	<b>33.53N</b>	<b>112.3W</b>	<b>IP</b>	<b>SI</b>
Phoenix/Sky Harbor	722780	33.43N	112W	IP	SI
Tucson	722740	32.12N	110.9W	IP	SI
Winslow	723740	35.02N	110.7W	IP	SI
<b>Yuma</b>	<b>722800</b>	<b>32.65N</b>	<b>114.6W</b>	<b>IP</b>	<b>SI</b>

**ARKANSAS**

<b>Arkansas Aeroplex (formerly Eaker AFB)</b>					
Blytheville	<b>723408</b>	<b>35.97N</b>	<b>89.95W</b>	<b>IP</b>	<b>SI</b>
El Dorado/Goodwin	723419	33.22N	92.8W	IP	SI
Fayetteville/Drake	723445	36N	94.17W	IP	SI
<b>Fort Smith</b>	<b>723440</b>	<b>35.33N</b>	<b>94.37W</b>	<b>IP</b>	<b>SI</b>
Harrison/Boone	723446	36.27N	93.15W	IP	SI
<b>Little Rock AFB</b>	<b>723405</b>	<b>34.92N</b>	<b>92.15W</b>	<b>IP</b>	<b>SI</b>
Pine Bluff/Grider	723417	34.18N	91.93W	IP	SI
Texarkana/Webb	723418	33.45N	93.98W	IP	SI

**CALIFORNIA**

Alameda (formerly Alameda NAS)	745060	37.78N	122.3W	IP	SI
<b>Arcata/Eureka</b>	<b>725945</b>	<b>40.98N</b>	<b>124.1W</b>	<b>IP</b>	<b>SI</b>
Bakersfield/Meadows	723840	35.43N	119W	IP	SI
Barstow-Daggett	723815	34.85N	116.7W	IP	SI
<b>Beale AFB/Marysville</b>	<b>724837</b>	<b>39.13N</b>	<b>121.4W</b>	<b>IP</b>	<b>SI</b>

Blue Canon	725845	39.28N	120.7W	IP	SI
Camp Pendleton MCB (formerly MCAS)	722926	33.3N	117.3W	IP	SI
Crescent City	725946	41.78N	124.2W	IP	SI
<b>Edwards AFB</b>	<b>723810</b>	<b>34.9N</b>	<b>117.8W</b>	<b>IP</b>	<b>SI</b>
Fresno	723890	36.77N	119.7W	IP	SI
Imperial	747185	32.83N	115.5W	IP	SI
Lemoore NAS/Reeves	747020	36.33N	119.9W	IP	SI
Long Beach	722974	33.77N	118.1W	IP	SI
Long Beach (airport)	722970	33.82N	118.1W	IP	SI
<b>Los Angeles</b>	<b>722950</b>	<b>33.93N</b>	<b>118.4W</b>	<b>IP</b>	<b>SI</b>
March ARB (formerly AFB)/Riverside	722860	33.88N	117.2W	IP	SI
Marina Municipal/Fritzsche (formerly Fort Ord-Fritzsche Airfield)	724916	36.68N	121.7W	IP	SI
<b>McClellan AFB</b>	<b>724836</b>	<b>38.67N</b>	<b>121.4W</b>	<b>IP</b>	<b>SI</b>
<b>Merced (formerly Castle AFB)</b>	<b>724810</b>	<b>37.38N</b>	<b>120.5W</b>	<b>IP</b>	<b>SI</b>
Miramar NAS	722908	32.85N	117.1W	IP	SI
<b>Mountain View/Moffett Federal Airfield</b> <b>(formerly Moffett NAS)</b>	<b>745090</b>	<b>37.42N</b>	<b>122W</b>	<b>IP</b>	<b>SI</b>
Montague/Siskiyou	725955	41.78N	122.4W	IP	SI
Monterey Peninsula	724915	36.58N	121.8W	IP	SI
North Island NAS	722906	32.7N	117.2W	IP	SI
Sacramento/Mather Airport (formerly Mather Field)	724835	38.55N	121.3W	IP	SI
<b>San Bernardino (formerly Norton AFB)</b>	<b>722866</b>	<b>34.1N</b>	<b>117.2W</b>	<b>IP</b>	<b>SI</b>
Oakland	724930	37.73N	122.2W	IP	SI
Ontario	722865	34.05N	117.6W	IP	SI
Paso Robles	723965	35.67N	120.6W	IP	SI
Point Mugu	723910	34.12N	119.1W	IP	SI
Piedras/Blancas Point	723900	35.67N	121.2W	IP	SI
Red Bluff	725910	40.15N	122.2W	IP	SI
Sacramento/Executive	724830	38.52N	121.5W	IP	SI
San Clemente	722925	33.02N	118.5W	IP	SI
<b>San Diego/Lindbergh</b>	<b>722900</b>	<b>32.73N</b>	<b>117.1W</b>	<b>IP</b>	<b>SI</b>
San Francisco	724940	37.62N	122.3W	IP	SI
San Jose	724945	37.37N	121.9W	IP	SI
Sandburg	723830	34.75N	118.7W	IP	SI
Santa Barbara	723925	34.43N	119.8W	IP	SI
Stockton	724920	37.9N	121.2W	IP	SI
<b>Travis AFB/Fairfield</b>	<b>745160</b>	<b>38.27N</b>	<b>121.9W</b>	<b>IP</b>	<b>SI</b>
Tustin	722915	33.7N	117.8W	IP	SI
<b>Vandenberg AFB</b>	<b>723930</b>	<b>34.73N</b>	<b>120.5W</b>	<b>IP</b>	<b>SI</b>
Victorville (formerly George AFB)	723825	34.58N	117.3W	IP	SI
<b>COLORADO</b>					
<b>Buckley ANGB/Denver</b>	<b>724695</b>	<b>39.72N</b>	<b>104.7W</b>	<b>IP</b>	<b>SI</b>
<b>Colorado Springs</b>	<b>724660</b>	<b>38.82N</b>	<b>104.7W</b>	<b>IP</b>	<b>SI</b>
Denver/Stapleton	724690	39.75N	104.8W	IP	SI

Fort Carson/Butts	724680	38.68N	104.7W	IP	SI
<b>Grand Junction</b>	<b>724760</b>	<b>39.12N</b>	<b>108.5W</b>	<b>IP</b>	<b>SI</b>
La Junta	724635	38.05N	103.5W	IP	SI
<b>Pueblo</b>	<b>724640</b>	<b>38.28N</b>	<b>104.5W</b>	<b>IP</b>	<b>SI</b>
<b>Trinidad/Animas County</b>	<b>724645</b>	<b>37.27N</b>	<b>104.3W</b>	<b>IP</b>	<b>SI</b>
<b>CONNECTICUT</b>					
Bridgeport/Sikorski	725040	41.17N	73.13W	IP	SI
Hartford/Bradley	725080	41.93N	72.68W	IP	SI
<b>DELAWARE</b>					
<b>Dover AFB</b>	<b>724088</b>	<b>39.13N</b>	<b>75.47W</b>	<b>IP</b>	<b>SI</b>
<b>Wilmington</b>	<b>724089</b>	<b>39.68N</b>	<b>75.6W</b>	<b>IP</b>	<b>SI</b>
<b>DISTRICT OF COLUMBIA</b>					
Washington/Dulles	724030	38.95N	77.45W	IP	SI
Washington/National	724050	38.85N	77.03W	IP	SI
<b>FLORIDA</b>					
Apalachicola	722200	29.73N	85.03W	IP	SI
Cape Canaveral (formerly Cape Kennedy)	747940	28.47N	80.55W	IP	SI
Cecil Field NAS	722067	30.22N	81.88W	IP	SI
Daytona Beach	722056	29.18N	81.05W	IP	SI
<b>Eglin AFB/Valparaiso</b>	<b>722210</b>	<b>30.48N</b>	<b>86.53W</b>	<b>IP</b>	<b>SI</b>
<b>Fort Myers/Page Field</b>	<b>722106</b>	<b>26.58N</b>	<b>81.87W</b>	<b>IP</b>	<b>SI</b>
Fort Lauderdale/Hollywood	722025	26.07N	80.15W	IP	SI
Gainesville	722146	29.68N	82.27W	IP	SI
<b>Homestead ARB (formerly AFB)</b>	<b>722026</b>	<b>25.48N</b>	<b>80.38W</b>	<b>IP</b>	<b>SI</b>
Hurlburt Field	747770	30.43N	86.68W	IP	SI
Jacksonville	722060	30.5N	81.7W	IP	SI
Jacksonville/Craig	722068	30.33N	81.52W	IP	SI
<b>Jacksonville NAS</b>	<b>722065</b>	<b>30.23N</b>	<b>81.68W</b>	<b>IP</b>	<b>SI</b>
Key West	722010	24.55N	81.75W	IP	SI
<b>Key West NAF (formerly NAS)</b>	<b>722015</b>	<b>24.57N</b>	<b>81.68W</b>	<b>IP</b>	<b>SI</b>
<b>MacDill AFB/Tampa</b>	<b>747880</b>	<b>27.85N</b>	<b>82.52W</b>	<b>IP</b>	<b>SI</b>
Mayport Naval Air Station	722066	30.4N	81.42W	IP	SI
Melbourne	722040	28.1N	80.65W	IP	SI
Miami	722020	25.82N	80.28W	IP	SI
Miami/Kendall-Tamiami	722029	25.65N	80.43W	IP	SI
Orlando (Jetport)	722050	28.43N	81.32W	IP	SI
<b>Patrick AFB/Cocoa Beach</b>	<b>747950</b>	<b>28.23N</b>	<b>80.6W</b>	<b>IP</b>	<b>SI</b>
Pensacola	722220	30.47N	87.18W	IP	SI
<b>Pensacola NAS</b>	<b>722225</b>	<b>30.35N</b>	<b>87.32W</b>	<b>IP</b>	<b>SI</b>
St. Petersburg	722116	27.92N	82.68W	IP	SI
Tallahassee	722140	30.38N	84.37W	IP	SI
Tampa	722110	27.97N	82.53W	IP	SI
<b>Tyndall AFB</b>	<b>747750</b>	<b>30.07N</b>	<b>85.58W</b>	<b>IP</b>	<b>SI</b>
Vero Beach	722045	27.65N	80.42W	IP	SI
West Palm Beach	722030	26.68N	80.12W	IP	SI
Whiting Field NAS	722226	30.72N	87.02W	IP	SI

<b>GEORGIA</b>					
<b>Albany</b>	<b>722160</b>	<b>31.53N</b>	<b>84.18W</b>	IP	SI
<b>Atlanta</b>	<b>722190</b>	<b>33.65N</b>	<b>84.42W</b>	IP	SI
<b>Augusta/Bush</b>	<b>722180</b>	<b>33.37N</b>	<b>81.97W</b>	IP	SI
Brunswick/Malcolm	722137	31.15N	81.38W	IP	SI
Columbus	722255	32.52N	84.93W	IP	SI
Dobbins ARB (formerly AFB)/Marietta	722270	33.92N	84.52W	IP	SI
<b>Fort Benning</b>	<b>722250</b>	<b>32.33N</b>	<b>85W</b>	IP	SI
<b>Hunter AAF</b>	<b>747804</b>	<b>32.02N</b>	<b>81.15W</b>	IP	SI
Macon/Lewis Wilson	722170	32.7N	83.65W	IP	SI
<b>Moody AFB/Valdosta</b>	<b>747810</b>	<b>30.97N</b>	<b>83.2W</b>	IP	SI
Rome/Russell	723200	34.35N	85.17W	IP	SI
Savannah	722070	32.13N	81.2W	IP	SI
<b>Robins AFB</b> (formerly Warner Robins AFB)	<b>722175</b>	<b>32.63N</b>	<b>83.6W</b>	IP	SI
<b>HAWAII</b>					
<b>Barbers Point NAS/Oahu</b>	<b>911780</b>	<b>21.32N</b>	<b>158W</b>	IP	SI
Hilo	912850	19.72N	155W	IP	SI
Honolulu/Oahu	911820	21.35N	157.9W	IP	SI
Kahului/Maui	911900	20.9N	156.4W	IP	SI
Kaneohe/Oahu	911760	21.45N	157.7W	IP	SI
Lihue/Kauai	911650	21.98N	159.3W	IP	SI
<b>IDAHO</b>					
Boise Municipal	726810	43.57N	116.2W	IP	SI
Coeur D'Alene	727834	47.77N	116.8W	IP	SI
Idaho Falls/Fanning	725785	43.52N	112W	IP	SI
<b>Lewiston</b>	<b>727830</b>	<b>46.38N</b>	<b>117W</b>	IP	SI
<b>Mountain Home AFB</b>	<b>726815</b>	<b>43.05N</b>	<b>115.8W</b>	IP	SI
<b>Pocatello</b>	<b>725780</b>	<b>42.92N</b>	<b>112.6W</b>	IP	SI
<b>ILLINOIS</b>					
Champaign/Urbana	725315	40.03N	88.28W	IP	SI
Chicago/Midway	725340	41.78N	87.75W	IP	SI
<b>Chicago/O'Hare</b>	<b>725300</b>	<b>41.98N</b>	<b>87.9W</b>	IP	SI
Decatur	725316	39.83N	88.87W	IP	SI
Glenview (formerly NAS)	725306	42.08N	87.82W	IP	SI
<b>Moline/Quad City</b>	<b>725440</b>	<b>41.45N</b>	<b>90.52W</b>	IP	SI
Peoria	725320	40.67N	89.68W	IP	SI
<b>Scott AFB/Belleville</b>	<b>724338</b>	<b>38.55N</b>	<b>89.85W</b>	IP	SI
<b>Springfield/Capital</b>	<b>724390</b>	<b>39.85N</b>	<b>89.67W</b>	IP	SI
West Chicago/Du Page	725305	41.92N	88.25W	IP	SI
<b>INDIANANA</b>					
<b>Evansville Regional</b>	<b>724320</b>	<b>38.05N</b>	<b>87.53W</b>	IP	SI
Fort Wayne/Baer	725330	41N	85.2W	IP	SI
<b>Grissom ARB (formerly AFB)/Peru</b>	<b>725335</b>	<b>40.65N</b>	<b>86.15W</b>	IP	SI
Indianapolis	724380	39.73N	86.27W	IP	SI
<b>South Bend</b>	<b>725350</b>	<b>41.7N</b>	<b>86.32W</b>	IP	SI
<b>Terre Haute/Hulman</b>	<b>724373</b>	<b>39.45N</b>	<b>87.32W</b>	IP	SI

<b>IOWA</b>					
Burlington	725455	40.78N	91.13W	IP	SI
Cedar Rapids	725450	41.88N	91.7W	IP	SI
<b>Des Moines</b>	<b>725460</b>	<b>41.53N</b>	<b>93.65W</b>	<b>IP</b>	<b>SI</b>
Fort Dodge	725490	42.55N	94.18W	IP	SI
Mason City	725485	43.15N	93.33W	IP	SI
<b>Sioux City</b>	<b>725570</b>	<b>42.4N</b>	<b>96.38W</b>	<b>IP</b>	<b>SI</b>
Waterloo	725480	42.55N	92.4W	IP	SI
<b>KANSAS</b>					
Chanute/Martin John	724507	37.67N	95.48W	IP	SI
<b>Dodge City</b>	<b>724510</b>	<b>37.77N</b>	<b>99.97W</b>	<b>IP</b>	<b>SI</b>
<b>Ft Riley/Marshall</b>	<b>724550</b>	<b>39.05N</b>	<b>96.77W</b>	<b>IP</b>	<b>SI</b>
<b>Goodland/Renner</b>	<b>724650</b>	<b>39.37N</b>	<b>101.7W</b>	<b>IP</b>	<b>SI</b>
Hutchinson	724506	38.07N	97.87W	IP	SI
<b>McConnell AFB</b>	<b>724505</b>	<b>37.62N</b>	<b>97.27W</b>	<b>IP</b>	<b>SI</b>
Salina	724586	38.8N	97.65W	IP	SI
Topeka/Billard	724560	39.07N	95.62W	IP	SI
<b>Topeka/Forbes</b>	<b>724565</b>	<b>38.95N</b>	<b>95.67W</b>	<b>IP</b>	<b>SI</b>
Wichita/Mid-Continent	724500	37.65N	97.43W	IP	SI
<b>KENTUCKY</b>					
<b>Cincinnati/Covington</b>	<b>724210</b>	<b>39.05N</b>	<b>84.67W</b>	<b>IP</b>	<b>SI</b>
<b>Fort Campbell</b>	<b>746710</b>	<b>36.67N</b>	<b>87.5W</b>	<b>IP</b>	<b>SI</b>
<b>Fort Knox/Godman</b>	<b>724240</b>	<b>37.9N</b>	<b>85.97W</b>	<b>IP</b>	<b>SI</b>
Lexington/Bluegrass	724220	38.03N	84.6W	IP	SI
Louisville/Standiford	724230	38.18N	85.73W	IP	SI
<b>LOUISIANA</b>					
Alexandria/Esler	722487	31.4N	92.3W	IP	SI
<b>Barksdale AFB</b>	<b>722485</b>	<b>32.5N</b>	<b>93.67W</b>	<b>IP</b>	<b>SI</b>
Baton Rouge/Ryan	722317	30.53N	91.15W	IP	SI
<b>England Industrial Air Park</b> <i>(formerly England AFB)/Alexandria</i>	<b>747540</b>	<b>31.33N</b>	<b>92.55W</b>	<b>IP</b>	<b>SI</b>
Fort Polk	722390	31.05N	93.2W	IP	SI
Lafayette	722405	30.2N	91.98W	IP	SI
<b>Lake Charles</b>	<b>722400</b>	<b>30.12N</b>	<b>93.22W</b>	<b>IP</b>	<b>SI</b>
Monroe	722486	32.52N	92.03W	IP	SI
<b>New Orleans NAS</b>	<b>722316</b>	<b>29.83N</b>	<b>90.03W</b>	<b>IP</b>	<b>SI</b>
New Orleans/Lakefront	722315	30.05N	90.03W	IP	SI
New Orleans/International	722310	29.98N	90.25W	IP	SI
Shreveport	722480	32.47N	93.82W	IP	SI
<b>MAINE</b>					
Augusta	726185	44.32N	69.8W	IP	SI
<b>Bangor</b>	<b>726088</b>	<b>44.8N</b>	<b>68.83W</b>	<b>IP</b>	<b>SI</b>
<b>Brunswick NAS</b>	<b>743920</b>	<b>43.88N</b>	<b>69.93W</b>	<b>IP</b>	<b>SI</b>
<b>Loring Commerce Centre</b> <i>(formerly Loring AFB)/Limestone</i>	<b>727125</b>	<b>46.95N</b>	<b>67.88W</b>	<b>IP</b>	<b>SI</b>
Portland	726060	43.65N	70.32W	IP	SI

<b>MARYLAND</b>					
<b>Andrews AFB</b>	<b>745940</b>	<b>38.82N</b>	<b>76.87W</b>	<b>IP</b>	<b>SI</b>
Baltimore/Washington	724060	39.18N	76.67W	IP	SI
<b>Patuxent River NAS</b>	<b>724040</b>	<b>38.28N</b>	<b>76.4W</b>	<b>IP</b>	<b>SI</b>
<b>MASSACHUSETTS</b>					
Boston/Logan	725090	42.37N	71.03W	IP	SI
<b>Chicopee/Westover ARB</b>	<b>744910</b>	<b>42.2N</b>	<b>72.53W</b>	<b>IP</b>	<b>SI</b>
<b>Hanscom AFB/Bedford</b>	<b>744900</b>	<b>42.47N</b>	<b>71.28W</b>	<b>IP</b>	<b>SI</b>
<b>Otis ANGB</b>	<b>725060</b>	<b>41.65N</b>	<b>70.52W</b>	<b>IP</b>	<b>SI</b>
Weymouth (formerly South Weymouth NAS)	725097	42.15N	70.93W	IP	SI
Worcester	725095	42.27N	71.88W	IP	SI
<b>MICHIGAN</b>					
Alpena	726390	45.07N	83.57W	IP	SI
Battle Creek	725396	42.3N	85.25W	IP	SI
Detroit City	725375	42.42N	83.02W	IP	SI
Flint/Bishop	726370	42.97N	83.75W	IP	SI
Grand Rapids	726350	42.88N	85.52W	IP	SI
Houghton	727440	47.17N	88.5W	IP	SI
<b>Jackson/Reynolds</b>	<b>725395</b>	<b>42.27N</b>	<b>84.47W</b>	<b>IP</b>	<b>SI</b>
K. I. Sawyer AFB (closed)	727435	46.35N	87.4W	IP	SI
<b>Lansing/Capital</b>	<b>725390</b>	<b>42.77N</b>	<b>84.6W</b>	<b>IP</b>	<b>SI</b>
<b>Marquette</b>	<b>727430</b>	<b>46.53N</b>	<b>87.55W</b>	<b>IP</b>	<b>SI</b>
<b>Muskegon</b>	<b>726360</b>	<b>43.17N</b>	<b>86.25W</b>	<b>IP</b>	<b>SI</b>
<b>Oscoda (formerly Wurtsmith AFB)</b>	<b>726395</b>	<b>44.45N</b>	<b>83.4W</b>	<b>IP</b>	<b>SI</b>
Pellston/Emmet County	727347	45.57N	84.8W	IP	SI
Sault Ste. Marie	727340	46.47N	84.37W	IP	SI
<b>Selfridge ANGB</b>	<b>725377</b>	<b>42.62N</b>	<b>82.83W</b>	<b>IP</b>	<b>SI</b>
<b>Traverse City/Cherry Capital</b>	<b>726387</b>	<b>44.73N</b>	<b>85.58W</b>	<b>IP</b>	<b>SI</b>
<b>MIDWAY ISLAND</b>					
Midway Island NAS (closed)	910660	28.22N	177.3W	IP	SI
<b>MINNESOTA</b>					
Bemidji	727550	47.5N	94.93W	IP	SI
<b>Duluth</b>	<b>727450</b>	<b>46.83N</b>	<b>92.18W</b>	<b>IP</b>	<b>SI</b>
<b>International Falls</b>	<b>727470</b>	<b>48.57N</b>	<b>93.38W</b>	<b>IP</b>	<b>SI</b>
<b>Minneapolis-St. Paul</b>	<b>726580</b>	<b>44.88N</b>	<b>93.22W</b>	<b>IP</b>	<b>SI</b>
Rochester	726440	43.92N	92.5W	IP	SI
<b>MISSISSIPPI</b>					
<b>Columbus AFB</b>	<b>723306</b>	<b>33.65N</b>	<b>88.45W</b>	<b>IP</b>	<b>SI</b>
<b>Jackson/Thompson</b>	<b>722350</b>	<b>32.32N</b>	<b>90.08W</b>	<b>IP</b>	<b>SI</b>
<b>Keesler AFB/Biloxi</b>	<b>747686</b>	<b>30.42N</b>	<b>88.92W</b>	<b>IP</b>	<b>SI</b>
McComb/Lewis	722358	31.18N	90.47W	IP	SI
Meridian/Key Field ANGB	722340	32.33N	88.75W	IP	SI
<b>Meridian NAS/McCain</b>	<b>722345</b>	<b>32.55N</b>	<b>88.57W</b>	<b>IP</b>	<b>SI</b>
<b>MISSOURI</b>					
<b>Chesterfield/Spirit of St. Louis</b>	<b>724345</b>	<b>38.67N</b>	<b>90.65W</b>	<b>IP</b>	<b>SI</b>
<b>Columbia</b>	<b>724450</b>	<b>38.82N</b>	<b>92.22W</b>	<b>IP</b>	<b>SI</b>

<b>Fort Leonard Wood</b>	<b>724457</b>	<b>37.73N</b>	<b>92.13W</b>	<b>IP</b>	<b>SI</b>
Joplin	723495	37.15N	94.5W	IP	SI
<b>Kansas City/Richards-Gebaur ARS (formerly Richards-Gebaur AFB)</b>	<b>724466</b>	<b>38.85N</b>	<b>94.55W</b>	<b>IP</b>	<b>SI</b>
Springfield	724400	37.23N	93.38W	IP	SI
St. Louis/Lambert	724340	38.75N	90.37W	IP	SI
Whiteman AFB	724467	38.73N	93.55W	IP	SI
<b>MONTANA</b>					
<b>Billings/Logan</b>	<b>726770</b>	<b>45.8N</b>	<b>108.5W</b>	<b>IP</b>	<b>SI</b>
Butte/Mooney	726785	45.95N	112.5W	IP	SI
Cut Bank	727796	48.6N	112.3W	IP	SI
<b>Glasgow</b>	<b>727680</b>	<b>48.22N</b>	<b>106.6W</b>	<b>IP</b>	<b>SI</b>
Great Falls	727750	47.48N	111.3W	IP	SI
Havre	727770	48.55N	109.7W	IP	SI
<b>Helena</b>	<b>727720</b>	<b>46.6N</b>	<b>112W</b>	<b>IP</b>	<b>SI</b>
Kalispell/Glacier	727790	48.3N	114.2W	IP	SI
Lewistown	726776	47.05N	109.4W	IP	SI
<b>Malmstrom AFB</b>	<b>727755</b>	<b>47.5N</b>	<b>111.1W</b>	<b>IP</b>	<b>SI</b>
Miles City	742300	46.43N	105.8W	IP	SI
<b>Missoula</b>	<b>727730</b>	<b>46.92N</b>	<b>114W</b>	<b>IP</b>	<b>SI</b>
<b>NEBRASKA</b>					
<b>Grand Island</b>	<b>725520</b>	<b>40.97N</b>	<b>98.32W</b>	<b>IP</b>	<b>SI</b>
Lincoln	725510	40.85N	96.75W	IP	SI
<b>North Platte/Lee Bird</b>	<b>725620</b>	<b>41.13N</b>	<b>100.6W</b>	<b>IP</b>	<b>SI</b>
<b>Offutt AFB/Bellevue</b>	<b>725540</b>	<b>41.12N</b>	<b>95.92W</b>	<b>IP</b>	<b>SI</b>
Omaha/Eppley	725500	41.3N	95.9W	IP	SI
<b>Scottsbluff/Heilig</b>	<b>725660</b>	<b>41.87N</b>	<b>103.6W</b>	<b>IP</b>	<b>SI</b>
<b>NEVADA</b>					
Elko	725825	40.83N	115.7W	IP	SI
<b>Ely</b>	<b>724860</b>	<b>39.28N</b>	<b>114.8W</b>	<b>IP</b>	<b>SI</b>
Las Vegas/McCarran	723860	36.08N	115.1W	IP	SI
Mercury/Desert Rock	723870	36.62N	116W	IP	SI
<b>Nellis AFB</b>	<b>723865</b>	<b>36.23N</b>	<b>115W</b>	<b>IP</b>	<b>SI</b>
<b>Reno/Cannon</b>	<b>724880</b>	<b>39.5N</b>	<b>119.7W</b>	<b>IP</b>	<b>SI</b>
<b>Tonopah</b>	<b>724855</b>	<b>38.05N</b>	<b>117W</b>	<b>IP</b>	<b>SI</b>
<b>Winnemucca</b>	<b>725830</b>	<b>40.9N</b>	<b>117.8W</b>	<b>IP</b>	<b>SI</b>
<b>NEW HAMPSHIRE</b>					
Concord	726050	43.2N	71.5W	IP	SI
Lebanon	726116	43.63N	72.3W	IP	SI
Manchester	743945	42.93N	71.43W	IP	SI
<b>Pease ANGB (formerly AFB)/ Portsmouth</b>	<b>726055</b>	<b>43.08N</b>	<b>70.82W</b>	<b>IP</b>	<b>SI</b>
<b>NEW JERSEY</b>					
Atlantic City	724070	39.45N	74.57W	IP	SI
Lakehurst NAS	724090	40.03N	74.35W	IP	SI
<b>McGuire AFB</b>	<b>724096</b>	<b>40.02N</b>	<b>74.6W</b>	<b>IP</b>	<b>SI</b>

<b>Newark</b>	<b>725020</b>	<b>40.7N</b>	<b>74.17W</b>	<b>IP</b>	<b>SI</b>
Teterboro	725025	40.85N	74.07W	IP	SI
Trenton/Mercer County	724095	40.28N	74.82W	IP	SI
<b><i>NEW MEXICO</i></b>					
<b>Albuquerque</b>	<b>723650</b>	<b>35.05N</b>	<b>106.6W</b>	<b>IP</b>	<b>SI</b>
<b>Cannon AFB/Clovis</b>	<b>722686</b>	<b>34.38N</b>	<b>103.3W</b>	<b>IP</b>	<b>SI</b>
Carlsbad/Cavern City	722687	32.33N	104.2W	IP	SI
<b>Farmington</b>	<b>723658</b>	<b>36.75N</b>	<b>108.2W</b>	<b>IP</b>	<b>SI</b>
Gallup	723627	35.52N	108.7W	IP	SI
<b>Holloman AFB</b>	<b>747320</b>	<b>32.85N</b>	<b>106.1W</b>	<b>IP</b>	<b>SI</b>
Roswell/Industrial Air Center	722680	33.3N	104.5W	IP	SI
Tucumcari	723676	35.18N	103.6W	IP	SI
White Sands Missile Range	722690	32.38N	106.4W	IP	SI
<b><i>NEW YORK</i></b>					
<b>Albany County</b>	<b>725180</b>	<b>42.75N</b>	<b>73.8W</b>	<b>IP</b>	<b>SI</b>
Binghamton/Broome	725150	42.22N	75.98W	IP	SI
Buffalo	725280	42.93N	78.73W	IP	SI
Fort Drum/Wheeler	743700	44.05N	75.73W	IP	SI
Glen Falls/Warren	725185	43.33N	73.62W	IP	SI
Islip/MacArthur	725035	40.8N	73.1W	IP	SI
Jamestown	725235	42.15N	79.27W	IP	SI
New York/John F. Kennedy	744860	40.65N	73.78W	IP	SI
New York/LaGuardia	725030	40.77N	73.9W	IP	SI
<b>Newburgh/Stewart</b>	<b>725038</b>	<b>41.5N</b>	<b>74.1W</b>	<b>IP</b>	<b>SI</b>
<b>Niagara Falls</b>	<b>725287</b>	<b>43.1N</b>	<b>78.95W</b>	<b>IP</b>	<b>SI</b>
<b>Plattsburgh AFB</b>	<b>726225</b>	<b>44.65N</b>	<b>73.47W</b>	<b>IP</b>	<b>SI</b>
Poughkeepsie	725036	41.63N	73.88W	IP	SI
<b>Rome Business and Technology Park (formerly Griffiss AFB)</b>					
Syracuse/Hancock	725190	43.12N	76.12W	IP	SI
Utica/Oneida	725197	43.15N	75.38W	IP	SI
Watertown	726227	44N	76.02W	IP	SI
White Plains	725037	41.07N	73.7W	IP	SI
<b><i>NORTH CAROLINA</i></b>					
Asheville	723150	35.43N	82.55W	IP	SI
Cape Hatteras	723040	35.27N	75.55W	IP	SI
Charlotte/Douglas	723140	35.22N	80.93W	IP	SI
<b>Cherry Point MCAS</b>	<b>723090</b>	<b>34.9N</b>	<b>76.88W</b>	<b>IP</b>	<b>SI</b>
<b>Fort Bragg/Simmons</b>	<b>746930</b>	<b>35.13N</b>	<b>78.93W</b>	<b>IP</b>	<b>SI</b>
<b>Greensboro/Piedmont Triad</b>	<b>723170</b>	<b>36.08N</b>	<b>79.95W</b>	<b>IP</b>	<b>SI</b>
New River MCAS	723096	34.72N	77.45W	IP	SI
Pope AFB	723030	35.17N	79.02W	IP	SI
Raleigh-Durham	723060	35.87N	78.78W	IP	SI
<b>Seymour-Johnson AFB</b>	<b>723066</b>	<b>35.33N</b>	<b>77.97W</b>	<b>IP</b>	<b>SI</b>
<b><i>NORTH DAKOTA</i></b>					
<b>Bismarck</b>	<b>727640</b>	<b>46.77N</b>	<b>100.7W</b>	<b>IP</b>	<b>SI</b>

Dickinson	727645	46.8N	102.8W	IP	SI
Fargo/Hector	727530	46.9N	96.8W	IP	SI
<b>Grand Forks AFB</b>	<b>727575</b>	<b>47.97N</b>	<b>97.4W</b>	<b>IP</b>	<b>SI</b>
<b>Minot AFB</b>	<b>727675</b>	<b>48.42N</b>	<b>101.3W</b>	<b>IP</b>	<b>SI</b>
<b>OHIO</b>					
<b>Akron/Canton</b>	<b>725210</b>	<b>40.92N</b>	<b>81.43W</b>	<b>IP</b>	<b>SI</b>
Cincinnati/Lunkin	724297	39.1N	84.42W	IP	SI
Cleveland/Hopkins	725240	41.42N	81.87W	IP	SI
Dayton/Cox	724290	39.9N	84.2W	IP	SI
Mansfield/Lahm	725246	40.82N	82.52W	IP	SI
Port Columbus	724280	40N	82.88W	IP	SI
Rickenbacker ANGB	724285	39.82N	82.93W	IP	SI
<b>Toledo Express</b>	<b>725360</b>	<b>41.6N</b>	<b>83.8W</b>	<b>IP</b>	<b>SI</b>
<b>Wright-Patterson AFB</b>	<b>745700</b>	<b>39.83N</b>	<b>84.05W</b>	<b>IP</b>	<b>SI</b>
Youngstown	725250	41.27N	80.67W	IP	SI
Zanesville	724286	39.95N	81.9W	IP	SI
<b>OKLAHOMA</b>					
<b>Altus AFB</b>	<b>723520</b>	<b>34.67N</b>	<b>99.27W</b>	<b>IP</b>	<b>SI</b>
<b>Fort Sill</b>	<b>723550</b>	<b>34.65N</b>	<b>98.4W</b>	<b>IP</b>	<b>SI</b>
McAlester	723566	34.88N	95.78W	IP	SI
Oklahoma City	723530	35.4N	97.6W	IP	SI
<b>Tinker AFB</b>	<b>723540</b>	<b>35.42N</b>	<b>97.38W</b>	<b>IP</b>	<b>SI</b>
<b>Tulsa</b>	<b>723560</b>	<b>36.2N</b>	<b>95.9W</b>	<b>IP</b>	<b>SI</b>
<b>Vance AFB/Enid</b>	<b>723535</b>	<b>36.33N</b>	<b>97.92W</b>	<b>IP</b>	<b>SI</b>
<b>OREGON</b>					
<b>Astoria/Clatsop</b>	<b>727910</b>	<b>46.15N</b>	<b>123.8W</b>	<b>IP</b>	<b>SI</b>
Burns	726830	43.58N	118.9W	IP	SI
<b>Eugene/Mahlon Sweet</b>	<b>726930</b>	<b>44.12N</b>	<b>123.2W</b>	<b>IP</b>	<b>SI</b>
<b>Klamath Falls/Kingsley</b>	<b>725895</b>	<b>42.15N</b>	<b>121.7W</b>	<b>IP</b>	<b>SI</b>
<b>Medford/Jackson</b>	<b>725970</b>	<b>42.37N</b>	<b>122.8W</b>	<b>IP</b>	<b>SI</b>
North Bend	726917	43.42N	124.2W	IP	SI
<b>Pendleton</b>	<b>726880</b>	<b>45.68N</b>	<b>118.8W</b>	<b>IP</b>	<b>SI</b>
<b>Portland</b>	<b>726980</b>	<b>45.6N</b>	<b>122.6W</b>	<b>IP</b>	<b>SI</b>
Redmond	726835	44.25N	121.1W	IP	SI
Salem/McNary	726940	44.92N	123W	IP	SI
Sexton Summit	725975	42.62N	123.3W	IP	SI
<b>PENNSYLVANIA</b>					
Allentown/Bethlehem-Easton	725170	40.65N	75.43W	IP	SI
Altoona/Blair	725126	40.3N	78.32W	IP	SI
DuBois	725125	41.18N	78.9W	IP	SI
Johnstown/Cambrian	725127	40.32N	78.83W	IP	SI
<b>Middletown/Olmsted</b>	<b>725115</b>	<b>40.2N</b>	<b>76.77W</b>	<b>IP</b>	<b>SI</b>
Philadelphia	724080	39.88N	75.25W	IP	SI
Philadelphia Northeast	724085	40.08N	75.02W	IP	SI
<b>Pittsburgh</b>	<b>725200</b>	<b>40.5N</b>	<b>80.22W</b>	<b>IP</b>	<b>SI</b>
<b>Wilkes-Barre/Scranton</b>	<b>725130</b>	<b>41.33N</b>	<b>75.73W</b>	<b>IP</b>	<b>SI</b>

<b>Williamsport</b>	<b>725140</b>	<b>41.25N</b>	<b>76.92W</b>	<b>IP</b>	<b>SI</b>
Willow Grove NAS	724086	40.2N	75.15W	IP	SI
<b>RHODE ISLAND</b>					
Providence/Green	725070	41.73N	71.43W	IP	SI
<b>SOUTH CAROLINA</b>					
Beaufort	722085	32.48N	80.72W	IP	SI
<b>Charlestown</b>	<b>722080</b>	<b>32.9N</b>	<b>80.03W</b>	<b>IP</b>	<b>SI</b>
Columbia	723100	33.95N	81.12W	IP	SI
Florence	723106	34.18N	79.72W	IP	SI
<b>Greenville/Spartanburg</b>	<b>723120</b>	<b>34.9N</b>	<b>82.22W</b>	<b>IP</b>	<b>SI</b>
McEntire ANGS	723105	33.92N	80.8W	IP	SI
<b>Myrtle Beach</b>	<b>747910</b>	<b>33.68N</b>	<b>78.93W</b>	<b>IP</b>	<b>SI</b>
Shaw AFB/Sumter	<b>747900</b>	<b>33.97N</b>	<b>80.47W</b>	<b>IP</b>	<b>SI</b>
<b>SOUTH DAKOTA</b>					
Aberdeen	726590	45.45N	98.43W	IP	SI
<b>Ellsworth AFB</b>	<b>726625</b>	<b>44.15N</b>	<b>103.1W</b>	<b>IP</b>	<b>SI</b>
<b>Huron</b>	<b>726540</b>	<b>44.38N</b>	<b>98.22W</b>	<b>IP</b>	<b>SI</b>
Pierre	726686	44.38N	100.2W	IP	SI
Rapid City	726620	44.05N	103W	IP	SI
<b>Sioux Falls/Foss</b>	<b>726510</b>	<b>43.58N</b>	<b>96.73W</b>	<b>IP</b>	<b>SI</b>
<b>TENNESSEE</b>					
Bristol/Tri-City	723181	36.48N	82.4W	IP	SI
Chattanooga/Lovell	723240	35.03N	85.2W	IP	SI
Jackson/McKellar	723346	35.6N	88.92W	IP	SI
<b>Knoxville</b>	<b>723260</b>	<b>35.82N</b>	<b>83.93W</b>	<b>IP</b>	<b>SI</b>
<b>Memphis</b>	<b>723340</b>	<b>35.05N</b>	<b>90W</b>	<b>IP</b>	<b>SI</b>
Memphis NRC (formerly NAS)	723345	35.35N	89.87W	IP	SI
Nashville	723270	36.13N	86.68W	IP	SI
<b>TEXAS</b>					
Abilene	722660	32.42N	99.68W	IP	SI
<b>Amarillo</b>	<b>723630</b>	<b>35.23N</b>	<b>101.7W</b>	<b>IP</b>	<b>SI</b>
Austin/Mueller	722540	30.3N	97.7W	IP	SI
Beaumont-Port Arthur/Jefferson	722410	29.95N	94.02W	IP	SI
<b>Bergstrom AFB/Austin</b>	<b>722545</b>	<b>30.2N</b>	<b>97.68W</b>	<b>IP</b>	<b>SI</b>
<b>Brownsville</b>	<b>722500</b>	<b>25.9N</b>	<b>97.43W</b>	<b>IP</b>	<b>SI</b>
Chase NAS/Beeville	722556	28.37N	97.67W	IP	SI
Corpus Christi	722510	27.77N	97.5W	IP	SI
<b>Corpus Christi NAS</b>	<b>722515</b>	<b>27.7N</b>	<b>97.28W</b>	<b>IP</b>	<b>SI</b>
Dallas/Fort Worth	722590	32.9N	97.03W	IP	SI
Dallas/Love	722580	32.85N	96.85W	IP	SI
Dallas NAS/Hensley	722585	32.73N	96.97W	IP	SI
Del Rio	722610	29.37N	100.9W	IP	SI
<b>Dyess AFB/Abilene</b>	<b>690190</b>	<b>32.43N</b>	<b>99.85W</b>	<b>IP</b>	<b>SI</b>
El Paso	722700	31.8N	106.4W	IP	SI
<b>Fort Hood/Gray AAF</b>	<b>722576</b>	<b>31.07N</b>	<b>97.83W</b>	<b>IP</b>	<b>SI</b>
<b>Fort Worth NAS</b>	<b>722595</b>	<b>32.77N</b>	<b>97.45W</b>	<b>IP</b>	<b>SI</b>

Galveston/Scholes	722422	29.3N	94.8W	IP	SI
<b>Houston/Ellington</b>	<b>722436</b>	<b>29.6N</b>	<b>95.17W</b>	<b>IP</b>	<b>SI</b>
Houston/Intercontinental	722430	29.97N	95.35W	IP	SI
<b>Kelly AFB</b>	<b>722535</b>	<b>29.38N</b>	<b>98.58W</b>	<b>IP</b>	<b>SI</b>
Kingsville NAS	722516	27.5N	97.82W	IP	SI
<b>Laughlin AFB</b>	<b>722615</b>	<b>29.37N</b>	<b>100.7W</b>	<b>IP</b>	<b>SI</b>
Lubbock	722670	33.65N	101.8W	IP	SI
Lufkin/Angelina	722446	31.23N	94.75W	IP	SI
<b>Midland</b>	<b>722650</b>	<b>31.95N</b>	<b>102.1W</b>	<b>IP</b>	<b>SI</b>
Randolph AFB	722536	29.53N	98.28W	IP	SI
Reese AFB/Lubbock	722675	33.6N	102W	IP	SI
San Angelo/Mathis	722630	31.37N	100.5W	IP	SI
San Antonio	722530	29.53N	98.47W	IP	SI
Tyler/Pounds	722448	32.35N	95.4W	IP	SI
<b>Waco-Madison Cooper</b>	<b>722560</b>	<b>31.62N</b>	<b>97.22W</b>	<b>IP</b>	<b>SI</b>
Wichita Falls/Sheppard AFB	723510	33.98N	98.5W	IP	SI

**UTAH**

Cedar City	724755	37.7N	113.1W	IP	SI
<b>Hill AFB/Ogden</b>	<b>725755</b>	<b>41.12N</b>	<b>111.9W</b>	<b>IP</b>	<b>SI</b>
Provo	725724	40.22N	111.7W	IP	SI
Salt Lake City	725720	40.78N	111.9W	IP	SI
<b>Wendover</b>	<b>725810</b>	<b>40.73N</b>	<b>114W</b>	<b>IP</b>	<b>SI</b>

**VERMONT**

Burlington	726170	44.47N	73.15W	IP	SI
<b>VIRGINIA</b>					

Charlottesville	724016	38.13N	78.45W	IP	SI
<b>Fort Belvoir/Davison</b>	<b>724037</b>	<b>38.72N</b>	<b>77.18W</b>	<b>IP</b>	<b>SI</b>
<b>Langley AFB/Hampton</b>	<b>745980</b>	<b>37.08N</b>	<b>76.37W</b>	<b>IP</b>	<b>SI</b>
Newport News	723086	37.13N	76.5W	IP	SI
Norfolk	723080	36.9N	76.2W	IP	SI
Norfolk NAS/Chamber	723085	36.93N	76.28W	IP	SI
Oceana NAS/Soucek	723075	36.82N	76.03W	IP	SI
Quantico	724035	38.5N	77.3W	IP	SI
<b>Richmond</b>	<b>724010</b>	<b>37.5N</b>	<b>77.33W</b>	<b>IP</b>	<b>SI</b>
<b>Roanoke</b>	<b>724110</b>	<b>37.32N</b>	<b>79.97W</b>	<b>IP</b>	<b>SI</b>

**WASHINGTON**

Bellingham	727976	48.8N	122.5W	IP	SI
Bremerton	727928	47.5N	122.7W	IP	SI
<b>Fairchild AFB</b>	<b>727855</b>	<b>47.62N</b>	<b>117.6W</b>	<b>IP</b>	<b>SI</b>
Fort Lewis/Gray	742070	47.08N	122.5W	IP	SI
Hanford	727840	46.57N	119.6W	IP	SI
Kelso-Longview	727924	46.12N	122.9W	IP	SI
<b>McChord AFB/Tacoma</b>	<b>742060</b>	<b>47.13N</b>	<b>122.4W</b>	<b>IP</b>	<b>SI</b>
Olympia	727920	46.97N	122.9W	IP	SI
Quillayute State	727970	47.95N	124.5W	IP	SI
<b>Seattle/Boeing</b>	<b>727935</b>	<b>47.53N</b>	<b>122.3W</b>	<b>IP</b>	<b>SI</b>

Seattle-Tacoma	727930	47.45N	122.3W	IP	SI
Spokane	727850	47.63N	117.5W	IP	SI
Spokane/Felts	727856	47.68N	117.3W	IP	SI
Walla Walla	727846	46.1N	118.2W	IP	SI
Wenatchee/Pangborn	727825	47.4N	120.2W	IP	SI
Yakima	727810	46.57N	120.5W	IP	SI
<b>WEST VIRGINIA</b>					
Beckley	724120	37.78N	81.12W	IP	SI
Bluefield/Mercer	724125	37.3N	81.2W	IP	SI
<b>Charleston/Kanawha</b>	<b>724140</b>	<b>38.37N</b>	<b>81.6W</b>	<b>IP</b>	<b>SI</b>
<b>Huntington/Tri-State</b>	<b>724250</b>	<b>38.37N</b>	<b>82.55W</b>	<b>IP</b>	<b>SI</b>
Martinsburg	724177	39.4N	77.98W	IP	SI
Morgantown/Hart	724176	39.65N	79.92W	IP	SI
Wheeling/Ohio	724275	40.18N	80.65W	IP	SI
<b>WISCONSIN</b>					
Eau Claire	726435	44.9N	91.5W	IP	SI
<b>Green Bay/Straubel</b>	<b>726450</b>	<b>44.5N</b>	<b>88.1W</b>	<b>IP</b>	<b>SI</b>
<b>La Crosse</b>	<b>726430</b>	<b>43.9N</b>	<b>91.3W</b>	<b>IP</b>	<b>SI</b>
<b>Madison/Dane</b>	<b>726410</b>	<b>43.1N</b>	<b>89.3W</b>	<b>IP</b>	<b>SI</b>
Milwaukee/Mitchell	726400	43N	87.9W	IP	SI
<b>WYOMING</b>					
<b>Casper/Natrona</b>	<b>725690</b>	<b>42.92N</b>	<b>106.4W</b>	<b>IP</b>	<b>SI</b>
<b>Cheyenne/Francis E. Warren AFB</b>	<b>725640</b>	<b>41.15N</b>	<b>104.8W</b>	<b>IP</b>	<b>SI</b>
Lander	725760	42.82N	108.7W	IP	SI
<b>Rock Springs</b>	<b>725744</b>	<b>41.6N</b>	<b>109W</b>	<b>IP</b>	<b>SI</b>
Sheridan	726660	44.77N	106.9W	IP	SI

### Section 2B—Non-US Sites

Dar-El-Beida/Houari	603900	36.72N	3.25E	IP	SI
<b>ANTIGUA, ST. KITTS, NEVIS, BARBUDA AND MONTSERRAT</b>					
Coolidge	788620	17.12N	61.78W	IP	SI
<b>ARGENTINA</b>					
Buenos Aires/Ezeiza	875760	34.8S	58.53W	IP	SI
<b>ASCENSION ISLAND</b>					
Wideawake Field	619020	7.97S	14.4W	IP	SI
<b>AUSTRALIA</b>					
Adelaide	946720	34.9S	138.52E	IP	SI
Alice Springs	943260	23.8S	133.9E	IP	SI
Brisbane	945780	27.3S	153.1E	IP	SI
Darwin	941200	12.4S	130.87E	IP	SI
Melbourne	948660	37.6S	144.83E	IP	SI
Perth/Belmont	946100	31.9S	115.95E	IP	SI
Sydney	947670	33.9S	151.18E	IP	SI
Townsville	942940	19.2S	146.75E	IP	SI

	<b>AUSTRIA</b>				
Salzburg	111500	47.8N	13E	IP	SI
	<b>AZORES</b>				
<b>Lajes AB</b>	<b>85090</b>	<b>38.77N</b>	<b>27.1W</b>	<b>IP</b>	<b>SI</b>
	<b>BAHAMAS</b>				
Nassau	780730	25.05N	77.47W	IP	SI
	<b>BERMUDA</b>				
<b>Bermuda (formerly Bermuda NAS)/</b>					
Kindley	<b>780160</b>	<b>32.37N</b>	<b>64.68W</b>	<b>IP</b>	<b>SI</b>
	<b>BRAZIL</b>				
Belem/Val de Caes	821930	1.38S	48.48W	IP	SI
Galeao/Rio de Janeiro	837460	22.8S	43.25W	IP	SI
Santos Dumont/Rio de Janeiro	837550	22.9S	43.17W	IP	SI
	<b>BRITISH INDIAN OCEAN TERRITORY</b>				
Diego Garcia	619670	7.3S	72.4E	IP	SI
	<b>BURMA/MYANMAR</b>				
Rangoon/Mingaladon	480960	16.9N	96.18E	IP	SI
	<b>CANADA</b>				
<b>Argentia</b>	<b>718070</b>	<b>47.3N</b>	<b>54W</b>	<b>IP</b>	<b>SI</b>
Armstrong	718410	50.3N	89.03W	IP	SI
Calgary	718770	51.12N	114W	IP	SI
Cambridge Bay	719250	69.1N	105.1W	IP	SI
Cape Dyer	710940	66.58N	61.62W	IP	SI
Cape Parry	719480	70.17N	124.6W	IP	SI
Churchill	719130	58.75N	94.07W	IP	SI
Edmonton/Namao	711210	53.67N	113.4W	IP	SI
Estevan	718620	49.22N	102.9W	IP	SI
Fort Nelson	719450	58.83N	122.5W	IP	SI
Fort Smith	719340	60.02N	111.9W	IP	SI
Frobisher/Iqaluit	719090	63.75N	68.53W	IP	SI
Gander	718030	48.95N	54.57W	IP	SI
Goose Bay	718160	53.32N	60.42W	IP	SI
Grande Praire	719400	55.18N	118.8W	IP	SI
Halifax	713953	44.9N	63.5W	IP	SI
Hall Beach	710810	68.78N	81.25W	IP	SI
Hopedale	719000	55.45N	60.23W	IP	SI
Inuvik	719570	68.3N	133.4W	IP	SI
Kamloops	718870	50.7N	120.4W	IP	SI
Kapuskasing	718310	49.42N	82.47W	IP	SI
Montreal/Dorval	716270	45.47N	73.75W	IP	SI
North Bay	717310	46.35N	79.43W	IP	SI
Ottawa	716280	45.32N	75.67W	IP	SI
Port Hardy	711090	50.68N	127.3W	IP	SI
Prince George	718960	53.88N	122.6W	IP	SI
Resolute	719240	74.72N	94.98W	IP	SI
Saint Johns	718010	47.62N	52.73W	IP	SI

Sandspit	711010	53.25N	131.8W	IP	SI
Saskatoon	718660	52.17N	106.6W	IP	SI
Shepherd Bay	719110	68.82N	93.43W	IP	SI
Sioux Lookout	718420	50.12N	91.9W	IP	SI
Stephenville	718150	48.53N	58.55W	IP	SI
The Pas	718670	53.97N	101.1W	IP	SI
Thunder Bay	717490	48.37N	89.32W	IP	SI
Timmins	717390	48.57N	81.37W	IP	SI
Toronto/Pearson	716240	43.67N	79.63W	IP	SI
Vancouver	718920	49.18N	123.1W	IP	SI
Whitehorse	719640	60.72N	135W	IP	SI
Winnipeg	718520	49.9N	97.23W	IP	SI
Yarmouth	716030	43.83N	66.08W	IP	SI
Yellowknife	719360	62.47N	114.4W	IP	SI

**CAROLINE ISLANDS**

Koror/Palau Island	914080	7.3N	134.5E	IP	SI
Ponape Island	913480	6.97N	158.22E	IP	SI
Truk International/Moen Island	913340	7.47N	151.85E	IP	SI
Yap Island	914130	9.48N	138.08E	IP	SI

**CHILE**

Pudahuel	855740	33.3S	70.78W	IP	SI
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**CHINA**

Beijing	545110	39.93N	116.28E	IP	SI
Shanghai/Hongqiao	583670	31.17N	121.43E	IP	SI

**COLUMBIA**

Bogota/Eldorado	802220	4.7N	74.13W	IP	SI
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**COSTA RICA**

San Jose/Santa Maria	787620	10N	84.22W	IP	SI
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**CRETE**

<b>Iraklion</b>	<b>167540</b>	<b>35.33N</b>	<b>25.18E</b>	<b>IP</b>	<b>SI</b>
Souda Bay NSA (closed)	167464	35.53N	24.15E	IP	SI
Souda/Khania	167460	35.48N	24.12E	IP	SI

**CUBA**

<b>Guantanamo Bay Naval Base</b> <b>(formerly NAS)</b>	<b>783670</b>	<b>19.9N</b>	<b>75.13W</b>	<b>IP</b>	<b>SI</b>
Havana/Jose Marti	782240	22.98N	82.4W	IP	SI

**DOMINICAN REPUBLIC**

Caudedo/Las Americas	784850	18.43N	69.67W	IP	SI
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**ECUADOR**

Quito/Mariscal Sucre	840710	0.15S	78.48W	IP	SI
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**EGYPT**

Alexandria	623180	31.2N	29.95E	IP	SI
<b>Cairo</b>	<b>623660</b>	<b>30.13N</b>	<b>31.4E</b>	<b>IP</b>	<b>SI</b>

**EL SALVADOR**

Ilopango Caldera/San Salvador	786630	13.7N	89.12W	IP	SI
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**FIJI**

Nandi/Nadi	916800	17.7S	177.45E	IP	SI
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<b>FRANCE</b>					
Lyon/Bron	74800	45.72N	4.95E	IP	SI
Marseille/Marignane	76500	43.45N	5.23E	IP	SI
Paris/Orly	71490	48.73N	2.4E	IP	SI
<b>FRENCH GUIANA</b>					
Cayenne/Rochambeau	814050	4.83N	52.37W	IP	SI
<b>FRENCH POLYNESIA</b>					
Tahiti Island/Faaa	919380	17.5S	149.6W	IP	SI
<b>GERMANY</b>					
Augsburg/Mulhausen	108520	48.43N	10.93E	IP	SI
<b>Berlin/Tempelhof</b>	<b>103840</b>	<b>52.47N</b>	<b>13.4E</b>	<b>IP</b>	<b>SI</b>
Bremen	102240	53.05N	8.8E	IP	SI
Bremerhaven	101290	53.53N	8.58E	IP	SI
Coburg	106710	50.28N	10.98E	IP	SI
Erding	108690	48.32N	11.95E	IP	SI
Frankfurt am Main	106370	50.05N	8.6E	IP	SI
Giessen	105320	50.58N	8.7E	IP	SI
Grafenwohr	106870	49.7N	11.95E	IP	SI
Hahn (Airport)	106160	49.95N	7.27E	IP	SI
Hanau	106420	50.17N	8.97E	IP	SI
Hannover	103380	52.47N	9.7E	IP	SI
Heidelberg	107340	49.4N	8.65E	IP	SI
Idar-Oberstein	106180	49.7N	7.33E	IP	SI
Karlsruhe	107270	49.03N	8.37E	IP	SI
Kassel	104380	51.3N	9.45E	IP	SI
Kiel	100440	54.5N	10.28E	IP	SI
Kitzingen	106590	49.75N	10.2E	IP	SI
Mannheim/Neustadt	107290	49.52N	8.55E	IP	SI
Munich/Riem	108660	48.13N	11.7E	IP	SI
Nurnberg	107630	49.5N	11.08E	IP	SI
Oldenburg	102150	53.18N	8.17E	IP	SI
<b>Ramstein</b>	<b>106140</b>	<b>49.43N</b>	<b>7.6E</b>	<b>IP</b>	<b>SI</b>
Sembach AB	107120	49.5N	7.87E	IP	SI
Spangdahlem AB	106070	49.98N	6.7E	IP	SI
Stoetten	108360	48.67N	9.87E	IP	SI
<b>Stuttgart/Echterdingen</b>	<b>107380</b>	<b>48.68N</b>	<b>9.22E</b>	<b>IP</b>	<b>SI</b>
Ulm	108380	48.38N	9.95E	IP	SI
Wendelstein Mountain	109800	47.7N	12.02E	IP	SI
<b>Wiesbaden</b>	<b>106330</b>	<b>50.05N</b>	<b>8.33E</b>	<b>IP</b>	<b>SI</b>
Wurzburg	106550	49.77N	9.97E	IP	SI
Zweibrucken	107140	49.22N	7.4E	IP	SI
<b>GREECE</b>					
<b>Athens/Hellenikon</b>	<b>167160</b>	<b>37.9N</b>	<b>23.73E</b>	<b>IP</b>	<b>SI</b>
Elefsis	167180	38.07N	23.55E	IP	SI
Larissa	166480	39.63N	22.42E	IP	SI
Preveza/Aktion	166430	38.95N	20.77E	IP	SI

<b>GREENLAND</b>					
Angmagssalik	43600	65.6N	37.63W	IP	SI
Sondre Stromfjord	42310	67N	50.8W	IP	SI
<b>Thule AB</b>	<b>42020</b>	<b>76.53N</b>	<b>68.5W</b>	<b>IP</b>	<b>SI</b>
<b>GUAM</b>					
Agana (formerly Agana NAS)/Brewer	912120	13.48N	144.8E	IP	SI
<b>Andersen AFB</b>	<b>912180</b>	<b>13.58N</b>	<b>144.93E</b>	<b>IP</b>	<b>SI</b>
<b>GUATEMALA</b>					
Guatemala/La Aurora	786410	14.58N	90.52W	IP	SI
<b>HONDURAS</b>					
Tegucigalpa/Toncontin	787200	14.05N	87.22W	IP	SI
<b>HONG KONG</b>					
Hong Kong	450070	22.33N	114.18E	IP	SI
<b>HUNGARY</b>					
Budapest/Ferihegy	128390	47.43N	19.27E	IP	SI
<b>ICELAND</b>					
<b>Keflavik NAS</b>	<b>40180</b>	<b>63.97N</b>	<b>22.6W</b>	<b>IP</b>	<b>SI</b>
Reykjavik	40300	64.13N	21.9W	IP	SI
<b>INDIA</b>					
Bombay/Santa Cruz	430030	19.12N	72.85E	IP	SI
Calcutta/Dum-Dum	428090	22.65N	88.45E	IP	SI
Delhi/Safdarjung	421820	28.58N	77.2E	IP	SI
Hyderabad	431280	17.45N	78.47E	IP	SI
Madras/Menambarkkam	432790	13N	80.18E	IP	SI
<b>IRAQ</b>					
Baghdad/Sirsenk/Bam	406500	33.23N	44.23E	IP	SI
<b>IRAN</b>					
<b>Tehran-Mehrabad</b>					
(formerly Mehrabad AFB)	<b>407540</b>	<b>35.68N</b>	<b>51.35E</b>	<b>IP</b>	<b>SI</b>
<b>IRELAND</b>					
Dublin	39690	53.43N	6.25W	IP	SI
Shannon	39620	52.7N	8.92W	IP	SI
<b>ISRAEL</b>					
<b>Tel-Aviv-Yafo</b>	<b>401760</b>	<b>32.1N</b>	<b>34.78E</b>	<b>IP</b>	<b>SI</b>
<b>ISRAEL-JORDAN DMS</b>					
Jerusalem/Atarot	402900	31.87N	35.22E	IP	SI
<b>ITALY</b>					
<b>Aviano AB</b>	<b>160360</b>	<b>46.03N</b>	<b>12.6E</b>	<b>IP</b>	<b>SI</b>
Brindisi (formerly Casale AFB)	163200	40.65N	17.95E	IP	SI
Cagliari (formerly Elmas AFB)	165600	39.25N	9.05E	IP	SI
Ciampino	162390	41.8N	12.55E	IP	SI
Cimone Mountain	161340	44.2N	10.7E	IP	SI
Ghedi AB	160880	45.42N	10.28E	IP	SI
Milano/Linate	160800	45.43N	9.28E	IP	SI
Naples/Capodichino	162890	40.85N	14.3E	IP	SI
Pisa	161580	43.68N	10.38E	IP	SI

Rimini	161490	44.03N	12.62E	IP	SI
<b>Sigonella</b>	<b>164590</b>	<b>37.4N</b>	<b>14.92E</b>	<b>IP</b>	<b>SI</b>
Sigonella NAS	164594	37.4N	14.93E	IP	SI
Venezia/Tessera	161050	45.5N	12.33E	IP	SI
Villafranca	160900	45.38N	10.87E	IP	SI
<b>IVORY COAST</b>					
Abidjan/Port Bouet	655780	5.25N	3.93W	IP	SI
<b>JAMAICA</b>					
Kingston/Norman Manley	783970	17.93N	76.78W	IP	SI
<b>JAPAN</b>					
Ashiya	478030	33.88N	130.65E	IP	SI
Atsugi NAF (formerly NAS)	476790	35.45N	139.45E	IP	SI
Fukuoka	478070	33.58N	130.38E	IP	SI
<b>Fukuoka/Itazuke</b>	<b>478080</b>	<b>33.58N</b>	<b>130.45E</b>	<b>IP</b>	<b>SI</b>
Futenma AS	479330	26.27N	127.75E	IP	SI
Iruma	476430	35.83N	139.42E	IP	SI
Iwakuni	477640	34.15N	132.23E	IP	SI
<b>Kadena NAF</b>	<b>479310</b>	<b>26.35N</b>	<b>127.77E</b>	<b>IP</b>	<b>SI</b>
<b>Misawa AB</b>	<b>475800</b>	<b>40.7N</b>	<b>141.37E</b>	<b>IP</b>	<b>SI</b>
Morioka	475840	39.7N	141.17E	IP	SI
Nagasaki	478550	32.92N	129.92E	IP	SI
Nagoya	476350	35.25N	136.93E	IP	SI
Naha	479300	26.18N	127.65E	IP	SI
Osaka/Itami	477710	34.78N	135.45E	IP	SI
Sapporo	474120	43.05N	141.33E	IP	SI
Sasebo	478120	33.15N	129.73E	IP	SI
Tokyo	476620	35.68N	139.77E	IP	SI
Tokyo (International)	476710	35.55N	139.78E	IP	SI
<b>Yokota</b>	<b>476420</b>	<b>35.75N</b>	<b>139.35E</b>	<b>IP</b>	<b>SI</b>
<b>JORDAN</b>					
Amman	402700	31.98N	35.98E	IP	SI
<b>REPUBLIC OF KOREA</b>					
Camp Red Cloud/Uijd	471060	37.75N	127.03E	IP	SI
Chupungnyong	471350	36.22N	128E	IP	SI
Inchon	471120	37.48N	126.63E	IP	SI
Kangnung	471070	37.75N	128.95E	IP	SI
Kunsan	471410	35.9N	126.62E	IP	SI
Kwangju	471580	35.12N	126.82E	IP	SI
Mangilsan	471260	36.93N	126.45E	IP	SI
Mosulpo	471870	33.2N	126.27E	IP	SI
<b>Osan AB</b>	<b>471220</b>	<b>37.08N</b>	<b>127.03E</b>	<b>IP</b>	<b>SI</b>
Pusan	471590	35.1N	129.03E	IP	SI
Pusan/Kimhae	471530	35.18N	128.93E	IP	SI
Pyongtaek Taeng-Ni	471270	36.97N	127.03E	IP	SI
Seoul	471170	37.5N	126.93E	IP	SI
Seoul East	471110	37.43N	127.12E	IP	SI

Seoul/Kimpo	471100	37.55N	126.8E	IP	SI
Taegu	471420	35.9N	128.65E	IP	SI
Taejon	471320	36.33N	127.38E	IP	SI
<b>LEBANON</b>					
Beirut	401000	33.82N	35.48E	IP	SI
<b>LIBYA</b>					
Baninah/Benghazi	620530	32.08N	20.27E	IP	SI
Tripoli	620100	32.67N	13.15E	IP	SI
<b>MALAYSIA</b>					
Kuala Lumpur/Subang	486470	3.12N	101.55E	IP	SI
Pinang/Bayan Lepas	486010	5.3N	100.27E	IP	SI
<b>MARSHALL ISLANDS</b>					
Kwajalein/Bucholz	913660	8.73N	167.73E	IP	SI
Majuro	913760	7.1N	171.4E	IP	SI
<b>MEXICO</b>					
Mexico City	766793	19.43N	99.1W	IP	SI
<b>MOROCCO</b>					
Rabat/Sale	601350	34.05N	6.77W	IP	SI
Tangier/Boukhalef Souahel	601010	35.73N	5.9W	IP	SI
<b>NETHERLANDS</b>					
Amsterdam/Schiphol	62400	52.3N	4.77E	IP	SI
Hoek Van Holland	63300	51.98N	4.1E	IP	SI
Soesterberg	62650	52.13N	5.27E	IP	SI
Volkel	63750	51.65N	5.7E	IP	SI
<b>NEW ZEALAND</b>					
Christchurch	937800	43.4S	172.55E	IP	SI
Wellington	934360	41.3S	174.8E	IP	SI
<b>NICARAGUA</b>					
Managua/Augusto Cesnigaragua	787410	12.15N	86.17W	IP	SI
<b>NORTHERN MARIANA ISLANDS</b>					
Saipan	912320	15.12N	145.73E	IP	SI
<b>NORWAY</b>					
Oslo/Fornebu	14880	59.9N	10.62E	IP	SI
<b>PHILIPPINES</b>					
Baguio/Luzon Island	983280	16.42N	120.6E	IP	SI
<b>Clark International</b>					
<b>(formerly ClarkAFB)/Luzon Island</b>	<b>983270</b>	<b>15.18N</b>	<b>120.55E</b>	<b>IP</b>	<b>SI</b>
Manila/Ninoy Aquino	984290	14.52N	121E	IP	SI
Olongapo	984260	14.8N	120.27E	IP	SI
<b>PAKISTAN</b>					
Karachi	417800	24.9N	67.13E	IP	SI
<b>POLAND</b>					
Warsaw/Okecie	123750	52.17N	20.97E	IP	SI
<b>PANAMA</b>					
<b>Howard AFB</b>	<b>788060</b>	<b>8.92N</b>	<b>79.6W</b>	<b>IP</b>	<b>SI</b>
Tocumen	787920	9.05N	79.37W	IP	SI

<b>NORTH PACIFIC</b>						
Johnston Island	912750	16.73N	169.5W	IP	SI	
	<b>PARAGUAY</b>					
Asuncion/Silvio Pettirossi	862180	25.2S	57.63W	IP	SI	
	<b>PERU</b>					
Lima/Jorge Chavez	846280	12S	77.12W	IP	SI	
	<b>PORTUGAL</b>					
Lisbon/Portela	85360	38.78N	9.13W	IP	SI	
	<b>PUERTO RICO</b>					
<b>Aguadilla/Borinquen</b>	<b>785140</b>	<b>18.5N</b>	<b>67.13W</b>	<b>IP</b>	<b>SI</b>	
Roosevelt Roads NS (formerly NAS)	785350	18.25N	65.63W	IP	SI	
San Juan	785260	18.43N	66W	IP	SI	
	<b>RUSSIA</b>					
Moscow/Sheremetev	275155	55.98N	37.5E	IP	SI	
	<b>SAUDI ARABIA</b>					
<b>Dhahran</b>	<b>404160</b>	<b>26.27N</b>	<b>50.15E</b>	<b>IP</b>	<b>SI</b>	
Riyadh	404380	24.72N	46.72E	IP	SI	
	<b>SEYCHELLES</b>					
Seychelles	639800	4.67S	55.52E	IP	SI	
	<b>SINGAPORE</b>					
Singapore/Payalebar	486940	1.37N	103.92E	IP	SI	
	<b>SPAIN</b>					
Alicante/El Altet	83600	38.28N	0.55W	IP	SI	
Barcelona	81810	41.28N	2.07E	IP	SI	
Cordoba	84100	37.85N	4.83W	IP	SI	
Madrid/Barajas	82210	40.45N	3.55W	IP	SI	
Mahon/Menorca Island	83140	39.87N	4.23E	IP	SI	
Malaga	84820	36.67N	4.48W	IP	SI	
Moron	83970	37.15N	5.62W	IP	SI	
<b>Rota NS</b>	<b>84490</b>	<b>36.65N</b>	<b>6.35W</b>	<b>IP</b>	<b>SI</b>	
Sevilla	83910	37.42N	5.9W	IP	SI	
<b>Torrejon</b>	<b>82270</b>	<b>40.48N</b>	<b>3.47W</b>	<b>IP</b>	<b>SI</b>	
Valencia	82840	39.5N	0.47W	IP	SI	
Zaragoza	81605	41.67N	1.05W	IP	SI	
	<b>SURINAM</b>					
Zanderij/Paramaribo	812250	5.45N	55.2W	IP	SI	
	<b>SWEDEN</b>					
Stockholm/Bromma	24640	59.35N	17.95E	IP	SI	
	<b>SWITZERLAND</b>					
Geneva/Cointrin	67000	46.25N	6.13E	IP	SI	
	<b>TAIWAN</b>					
Chia-i	467460	23.47N	120.38E	IP	SI	
<b>Sungshan/Taipei</b>	<b>466960</b>	<b>25.07N</b>	<b>121.55E</b>	<b>IP</b>	<b>SI</b>	
Taichung	467510	24.18N	120.65E	IP	SI	
Tainan	467430	22.95N	120.2E	IP	SI	
Wuchia Observatory	467700	24.27N	120.62E	IP	SI	

<b>THAILAND</b>					
<b>Bangkok/Don Muang</b>	<b>484560</b>	<b>13.92N</b>	<b>100.6E</b>	IP	SI
Chiang Mai	483270	18.78N	98.98E	IP	SI
Korat/Nakhon Ratchasima	484310	14.97N	102.08E	IP	SI
<b>Nakhon Phanom</b>	<b>483570</b>	<b>17.42N</b>	<b>104.78E</b>	IP	SI
Ubon/Ratchathani (formerly AB)	484070	15.25N	104.87E	IP	SI
Udon Thani	483540	17.38N	102.8E	IP	SI
<b>TUNISIA</b>					
Tunis/Carthage	607150	36.83N	10.23E	IP	SI
<b>TURKEY</b>					
<b>Adana/Incirlik AFB</b>	<b>173500</b>	<b>37N</b>	<b>35.42E</b>	IP	SI
Ankara/Esenboga	171280	40.12N	32.98E	IP	SI
Balikesir	171500	39.62N	27.92E	IP	SI
Diyarbakir	172800	37.88N	40.18E	IP	SI
Eskisehir	171240	39.78N	30.57E	IP	SI
Golcuk/Dumlupinar	170670	40.72N	29.82E	IP	SI
Istanbul/Ataturk AB	170600	40.97N	28.82E	IP	SI
Izmir/Cigli	172180	38.5N	27.02E	IP	SI
Malatya/Erhac	172000	38.43N	38.08E	IP	SI
Samsun	170300	41.28N	36.33E	IP	SI
Sinop	170260	42.03N	35.17E	IP	SI
<b>UNITED KINGDOM</b>					
Aberdeen/Dyce	30910	57.2N	2.22W	IP	SI
Benson	36580	51.62N	1.08W	IP	SI
<b>Bentwaters</b>	<b>35963</b>	<b>52.13N</b>	<b>1.43E</b>	IP	SI
Brize Norton	36490	51.75N	1.58W	IP	SI
Church Lawford	35440	52.37N	1.33W	IP	SI
Edinburgh	31600	55.95N	3.35W	IP	SI
Fylingdales	32810	54.37N	0.67W	IP	SI
Leuchars	31710	56.38N	2.87W	IP	SI
London/Gatwick	37760	51.15N	0.18W	IP	SI
London/Heathrow	37720	51.48N	0.45W	IP	SI
<b>Mildenhall</b>	<b>35770</b>	<b>52.37N</b>	<b>0.48E</b>	IP	SI
Northolt	36720	51.55N	0.42W	IP	SI
Prestwick	31350	55.5N	4.58W	IP	SI
Woodbridge	35953	52.08N	1.4E	IP	SI
<b>URUGUAY</b>					
Carrasco	865800	34.8S	56W	IP	SI
<b>VIETNAM</b>					
Da Nang	488550	16.03N	108.18E	IP	SI
<b>Ho Chi Minh City/Tan Son Nhut</b>	<b>489000</b>	<b>10.82N</b>	<b>106.67E</b>	IP	SI
<b>WAKE ISLAND</b>					
Wake Island Airfield	912450	19.28N	166.65E	IP	SI
<b>YUGOSLAVIA</b>					
Belgrade/Surcin	132720	44.82N	20.28E	IP	SI

**MICHAEL E. ZETTLER, Lt General, USAF  
DCS/Installations & Logistics**

**L.M. SMITH  
Rear Admiral, CEC, USN, U.S. Navy  
Commander, Naval Facilities Engineering Command**

**Attachment 1****GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****Section A1A—References***

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***Section A1B—Abbreviations and Acronyms***

**AAF**—Army Air Field

**AB**—Air Base

**AFB**—Air Force Base

**AFS**—Air Force Station

**ANGB**—Air National Guard Base

**ANGS**—Air National Guard Station

**ARB**—Air Reserve Base

**ARS**—Air Reserve Station

**Btu/lb**—British thermal units per pound of air (enthalpy)

**Btu/sq ft/day**—Btu per square foot per day (solar radiation)

**cm**—Centimeter (frost depth)

**cm/hr**—Centimeters per hour (rain rate)

**gr/lb**—Grains per pound (humidity ratio, grains of water vapor per pound of air)

**gr/kg**—Grams per kilogram (humidity ratio, grams of water vapor per kilogram of air)

**in Hg**—Inches of mercury (atmospheric pressure)

**in**—Inches (frost depth)

**in/hr**—Inches per hour (rain rate)

**kBtu/cfm**—Thousands of Btu per cubic foot per minute (sensible or latent heating or cooling loads)

**kJ/kg**—Thousands of joules per kilogram (enthalpy)

**klux-hr**—Thousands of lux-hours (average incident illuminance)

**kN/sq m**—Thousands of newtons per square meter (snow load)

**kWh/l/s**—kilowatt hours per liter per second (sensible or latent heating or cooling loads)

**kWh/l/s/yr**—kilowatt hours per liter per second per year

**lb/sq ft**—pounds per square foot (snow load)

**m/s**—meters per second (wind speed)

**mb Hg**—millibars of mercury (atmospheric pressure)

**MCAS**—Marine Corps air station

**MCB**—Marine Corps base

**mph**—miles per hour (wind speed)

**NAS**—Naval Air Station

**NAF**—Naval Air Facility

**NRC**—Naval Reserve Center

**NS**—Naval Station

**NSA**—Naval Support Activity

**ton-hrs/cfm/yr**—ton-hours of load per cubic foot per minute per year (Btu÷12,000)